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EXCAVATING ENGINEER

FOUNDED 1905

Vol. XXXIII February 1939 Number 2

Presenting the Bucyrus Erie NEW 29-B

ONE-YARD

SHOVEL • DRAGLINE • CLAMSHELL • CRANE • DRAGSHOVE

FAST, powerful, compact, the 29-B adds an important new machine to Bucyrus-Erie's world-famous line of modern excavators. High-speed digging, swinging and dumping are synchronized in the 29-B for a smooth cycle with fast acceleration, quick stops and accurate control. "Speedlined" power rides directly to the dipper teeth on anti-friction bearings through a straight-line gear train and two-part hoist. Longer upper boom section and big boom-point sheaves give better digging angles; longer rope wear. A simple, direct-action chain crowd insures a positive, powerful thrust that cuts big bites from the bank. Through the new type center pintle with special thrust washer, the propelling shaft delivers ample power for quick moves. This up-to-date one-yard winner is a machine worth knowing — write today for detailed, illustrated specifications.

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Gasoline, Diesel or electric power. Shovel uses 1-yard welded, cast V-front, inserted-tooth, curved door dipper. With standard boom combination at 45°, maximum cutting radius 31'6"; clear dumping height 17'6"; working weight 65,000 pounds. High-speed independent live boom hoist available. Crane rating at 12' radius is 31,900 pounds. Draglines and clamshells usually use 1-yard buckets and booms 40 to 55 feet. Electro magnet for crane available.

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BUCYRUS ERIE

BUCYRUS-ERIE CO., SOUTH MILWAUKEE, WIS., U. S. A.

Excavating, Drilling, and Material Handling Equipment

EXCAVATING ENGINEER

FOUNDED 1905

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LOOKING AHEAD

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Men and Machines

New crews hang up interesting performance record on San Jacinto adit of Colorado River Aqueduct. A good illustration of what can be done with modern equipment.

Limestone

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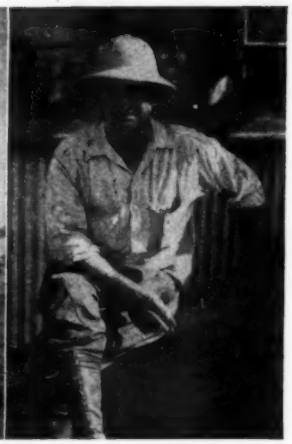
ARROYO SECO GOLD DREDGING CO., *Powers Dredge with* ATLAS DIESEL



Harry C. Smith, Superintendent
Arroyo Seco Gold Dredging Co.

The Arroyo Seco Gold Dredging Co. has for a few years operated two gold dredges near Ione, California with purchased electric power. With the acquisition of new property far off the high lines, they decided to power a 2½ cu. ft. bucket dredge with Diesel power.

They engaged the Walter W. Johnson Company, prominent San Francisco dredge building engineers, to design and reconstruct the new Diesel electric dredge. Because of their satisfactory experience with ten Atlas Diesels previously specified for gold dredges, they chose a 6 cylinder, 9"x10½" enclosed type Atlas Diesel which develops 200 H.P. at 514 RPM. This engine drives a 125 K.W. alternating current generator with direct connected exciter at 900 RPM by means of a Texrope drive.

During the first 95 days of operation, the dredge dug a total of 154,935 cubic yards to a depth of between six and seven feet in ground that was particularly tough going. This is an average of 1,631 yards per day. This property is being worked on three 8 hour shifts with a 20 minute shutdown each day for oiling, during which the engine continues to operate. The engine is stopped but one hour each week for changing lubricating oil.

The cooling system is of the closed circuit type. Pipe coils are suspended on the outside of the dredge and cooled by the water in the pond. Soft water is circulated through the coils and engine by a V-belt driven centrifugal pump. The cooling system is provided with the necessary surge tank and by-pass valves to vary the amount of cooling surface in use. Altogether this dredge represents the last word in design for economical and dependable motor power.

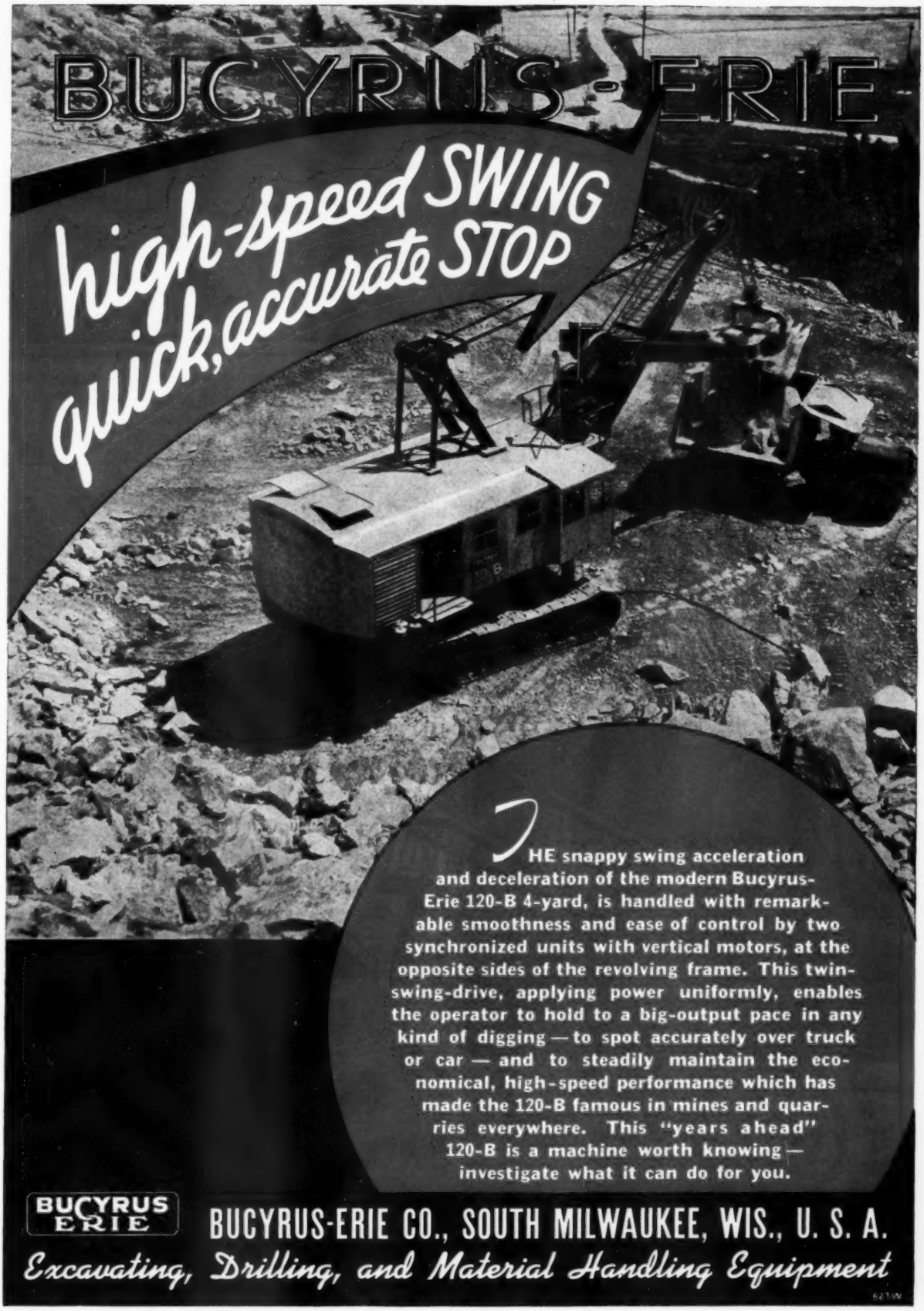
Partial view of engine room.

ATLAS IMPERIAL DIESEL ENGINE CO.

Oakland, California — Mattoon, Illinois

ATLAS IMPERIAL

For your convenience in writing to Atlas Imperial Diesel Engine Co., you will find a card bound in this issue.



THE snappy swing acceleration and deceleration of the modern Bucyrus-Erie 120-B 4-yard, is handled with remarkable smoothness and ease of control by two synchronized units with vertical motors, at the opposite sides of the revolving frame. This twin-swing-drive, applying power uniformly, enables the operator to hold to a big-output pace in any kind of digging — to spot accurately over truck or car — and to steadily maintain the economical, high-speed performance which has made the 120-B famous in mines and quarries everywhere. This "years ahead" 120-B is a machine worth knowing — investigate what it can do for you.

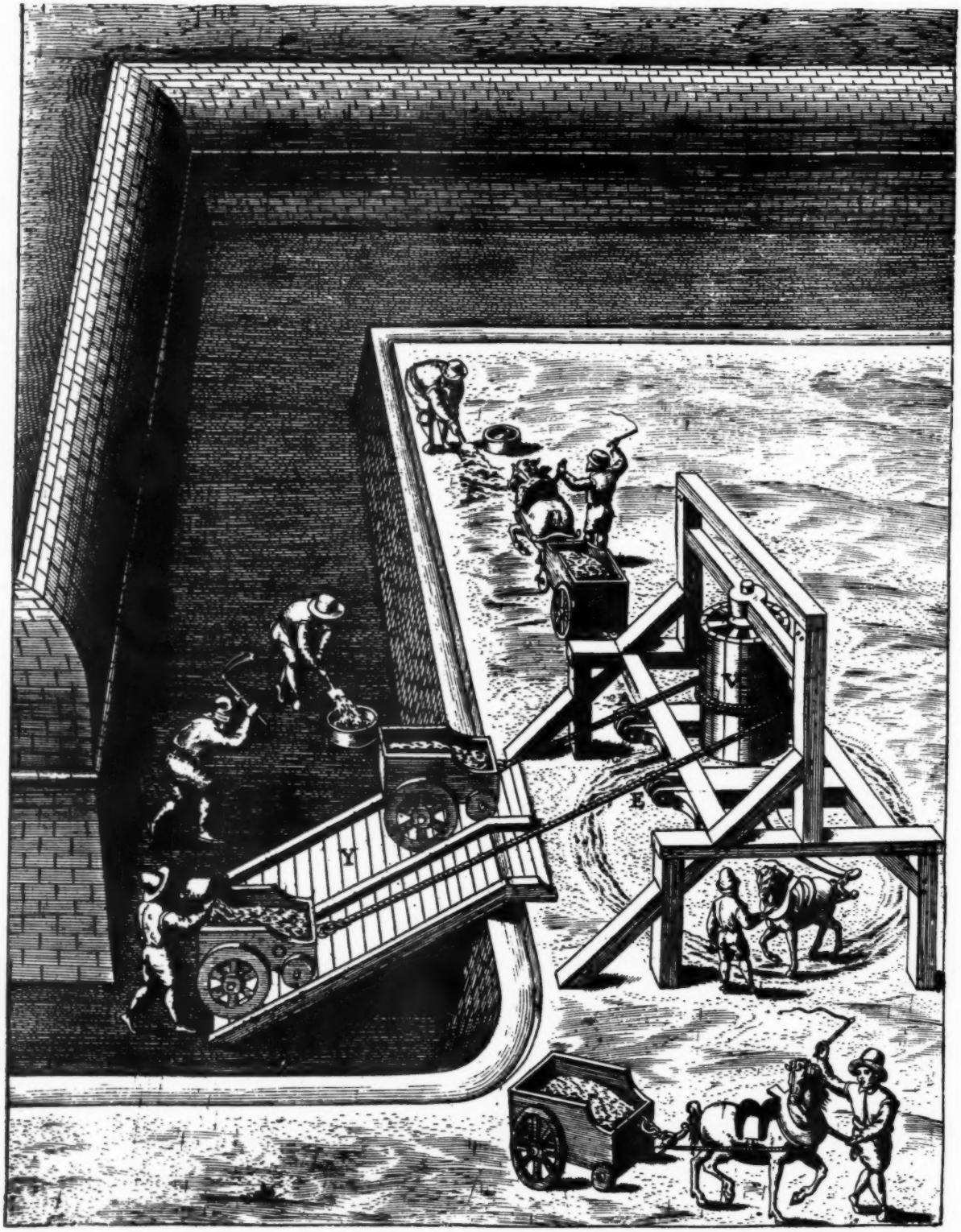
BUCYRUS ERIE

BUCYRUS-ERIE CO., SOUTH MILWAUKEE, WIS., U. S. A.

Excavating, Drilling, and Material Handling Equipment

627-W

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.



● This excavating system was invented in the 16th century by one Captain Agostino Ramelli. The picture was printed in an "engineering manual" published in 1588. Nothing is said in the text to show how the axles are arranged so the wagons stay level on both incline and flat ground surface.

Lubricants

For The Gasoline Tractor

By C. J. COPLEY

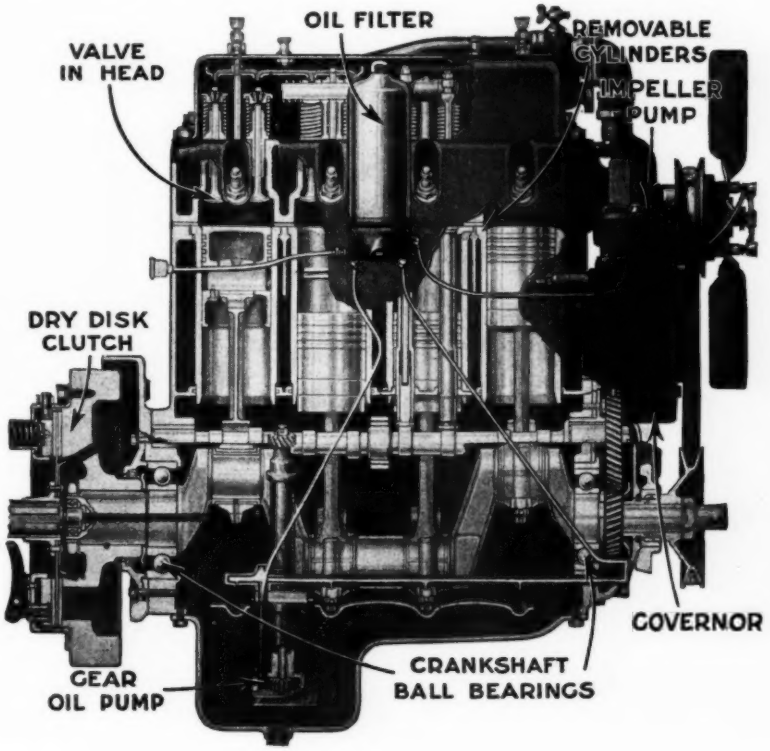
THERE are probably 999 different kinds, types, brands and classes of lubricants being sold today for the maintenance of tractors powered by gasoline engines. There probably has been enough material written on the subject of the lubrication of the Gasoline Tractor to fill 999 volumes of closely-written text. It is not our purpose in this article, to suggest the 1000th lubricant nor to contribute material for the 1000th volume. There are plenty of lubricants already available to satisfactorily service the tractor. There also are plenty of existing instructions and advices enabling an owner or operator to intelligently apply these lubricants.

There is a problem, however, confronting the individual responsible for the efficient maintenance of the Gasoline Tractor, about which a little information may be welcomed. The old premise that "Fifty Million Frenchmen can't be wrong" unfortunately, does not apply to the 999 lubricants available for our subject equipment. There may be 999 lubricants, but 909 can be and most likely will be, unfitted for servicing our tractor. Therefore, in this article we will approach the problem of lubricant selection with a little reverse English—not so much from the angle of what should be used, but more from the viewpoint of what **not** to use.

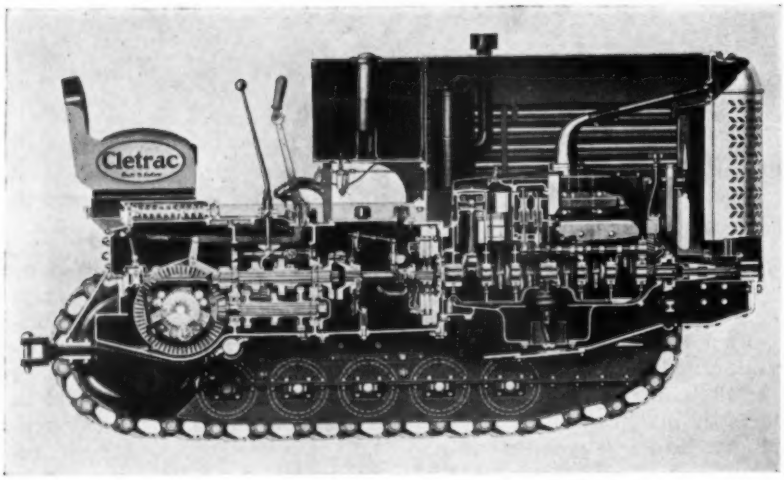
In the October issue of Excavating Engineer, we covered the theories evolving around the requirements lubricating oil must meet for servicing the Diesel Tractor. We showed how necessary it was that the lubricant for Diesel engine cylinders should not only resist carbonizing under high temperatures, but should also act as an added seal in the cylinder. We stressed the necessity of fluidity, stability and film strength being essential characteristics to be sought in our engine lubricant. We discussed the qualifications necessary in the gear lubricant and touched on the duties to be performed by the chassis and wheel greases.

While our subject was the Diesel Tractor, the same theory of lubrication, the same necessary characteristics in our lubricants should be sought for our Gasoline Tractor. The only service difference lies in our power plant where, in the gasoline engine, temperatures and pressures being more moderate, the demands on the engine oil are not so exacting. In the lubrication of the gasoline engine, we are still vitally interested in the protection the lubricant offers against wear of moving parts, in its clean burning qualities, in its stability and in its film strength. Since the reasons for demanding these requirements have been previously discussed—and though we certainly do not intimate they may be overlooked in our gasoline engine lubricant—it is not our purpose in this article to amplify what already has been written. Let us rather look to eliminating those types of lubricants we know to be wrong for our Gasoline Tractor—and through this process of elimination set up certain classes of lubricants that we know will prove satisfactory.

Fundamentally, five types of lubricants are needed for the



● Circulating splash-type lubrication is used in this International T-20 TracTracTor. A gear-driven pump in crankcase oil sump actuates the system.



● Cross-section of a model CG Cletrac. This 6-cylinder engine has a plunger-type transmission oil pump, 13-gallon transmission oil case capacity, and 2-gallon crankcase oil capacity.

maintenance of the tractor. Certain specialty requirements may add one or two more, but in the main, an engine oil, a gear oil, a wheel bearing grease, a water pump grease and a general chassis grease, are the minimum number of products we can consider for efficient lubrication. The widely varying conditions the lubricant is called upon to meet in these five differing services, do not permit the pinch-hitting of any one for the other. While we appreciate the desire of the operator for stocking the minimum number of products, five radically different lubricants are needed—possibly more—certainly not less.

In discussing these five different lubricants, and their individual pecularities, we must immediately set up one requirement that is a common denominator to all five, namely, they must be well made. A good pastry cook given poor ingredients or a poor cook given good ingredients will turn out about the same kind of cake—a cake considerably below a gastronomic par. Just so is it with our lubricants. Quality lubricants, capable of providing maximum lubricating values, must be made from high grade crudes, refined by proven manufacturing processes and carefully blended or compounded, according to the dictates of studied application. With this common denominator of "manufacturing quality", we can probably eliminate 50% of the 999 lubricants available on the market today. It is interesting to note why so many sub-par lubricants are available and marketed. We have no hesitancy in throwing the responsibility where is belongs—right in the lap of the lubricant buyer. The oil refiner knows how to make good lubricants and usually has the proper raw materials to work with, but because a great many lubricant purchasers have the inclination to think and buy in terms of the **lowest** price per gallon—the refiner is forced to meet this type of buyer's demand with products made to meet a price and not necessarily made to do a real job of lubrication.

Thus we can set up one general "don't" in the purchasing of all five of our Gasoline Tractor lubricants. Don't buy alone on price per pound or per gallon. To make good lubricants requires good raw materials and careful process of manufacture. Quality lubricants will always be priced higher than inferior products and regardless of how low the price per gallon or pound, there is always still available a cut-price product.

In the following discussion, we are assuming that we are dealing only with quality lubricants and will try to segregate those high grade lubricants having the characteristics necessary for the Gasoline Tractor.

Since the gasoline engine itself requires the larger quantity of lubricant during operation, let us first consider the engine oil. Most tractor manufacturers, in their instruction books, specify by the S.A.E. numbering system the oil to be used in the engine. The operator or buyer should have a clear understanding of what these numbers signify. Only a few years ago engine lubricants were grouped by the refiner under the body classifications of Light, Heavy, Heavy Medium and so on, up to perhaps Ultra Heavy. Each refiner had his own idea of what constituted a Light or Heavy bodied oil. One refiner would list a given oil as Heavy Medium, whereas another refiner would list his oil of similar body as an Extra Heavy oil. Again two oils of widely different body might and would be listed as being both Extra Heavy lubricants. It is easy to appreciate the confusion that existed in the purchase or recommending of a lubricant of a definite body. No standard or conventional measuring stick of comparative oil body had been developed for popular use until the Society of Automotive Engineers undertook to clarify the situation through the body numbering system that bears the initials of the Society. This chart, developed by the Society of Automotive Engineers, while modified from time to time, today stands as shown below.

The tractor manufacturer in specifying the oil he recommends

S.A.E. Viscosity Number	Viscosity Range Saybolt Universal Seconds			
	At 130°F		At 210°F	
	Minimum	Maximum	Minimum	Maximum
10	90	Less than 120		
20	120	Less than 185		
30	185	Less than 255		
40	255			Less than 75
50			75	Less than 105
60			105	Less than 125
70			125	Less than 150

for the engine, selects the oil within the viscosity range he wants and covers this in his instructions by, let us say, an S.A.E. 30 engine oil. A glance at the chart will show that the oil he recommends must have a viscosity, at 130° F, between 185 seconds and 255 seconds. Hence the only restriction the builder places in the oil is that of a given body at a given temperature.

Reviewing for a moment the meaning of viscosity, we know it is measure of the rate of flow of a given oil at a stated temperature and consequently is an indication of comparative body in lubricating oils. By the Saybolt method of determining viscosity, a standard size and shape container is filled with the oil under investigation. The oil is heated to a temperature of 130° F. In the bottom of the container is an orifice of a given size through which the oil may flow. A cup of a standard capacity is placed under this orifice and, while maintaining the temperature of the oil in the container at 130° F, the time is accurately checked by a stop watch to determine how long it takes the oil to flow through the orifice and fill the cup. The time taken to fill the cup is always given in seconds. Hence our S.A.E. 30 oil having a viscosity between 185 seconds and 255 seconds at 130° F can be interpreted as requiring between 185 and 255 seconds to fill the Saybolt cup when the oil is heated to 130° F.

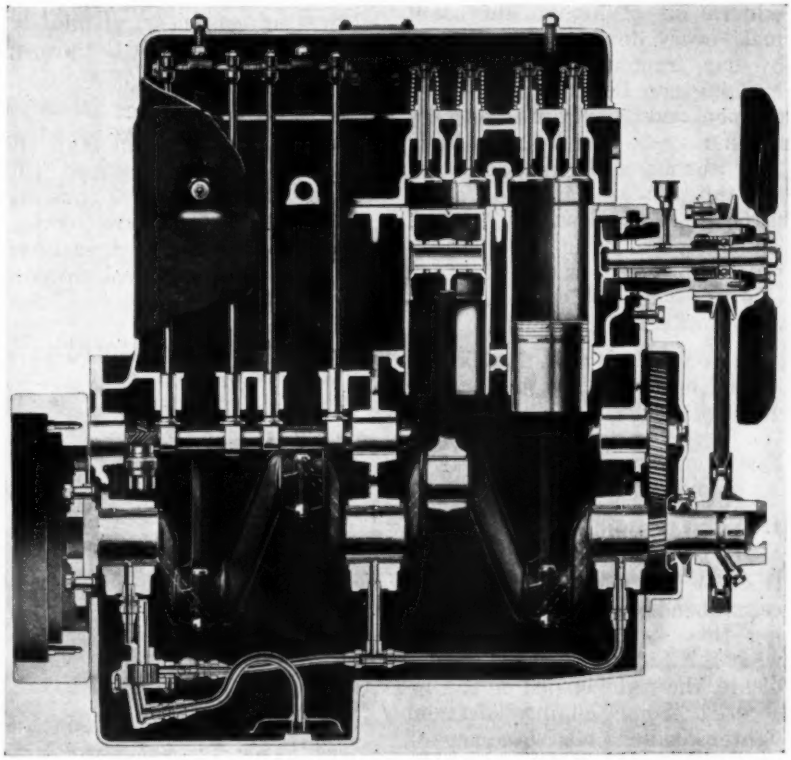
Thus the S.A.E. number may be determined for any oil and serves to definitely group engine lubricants in given body classes. There is no doubt the system served a much needed demand and tended to clear the air of the meaningless body classifications of Light, Medium, Heavy, Extra Heavy, etc., that for so long confused the buyer of lubricating oil.

The Society of Automotive Engineers did a splendid job by establishing this definite measuring stick of oil body—but unfortunately as improvements have taken place in refining methods resulting in improved oils, the S.A.E. system is now somewhat obsolete. Not only is it no longer a suitable measure, but the buyer is reading into S.A.E. number oil characteristics that were not the intention of the Society to specify. The buyer is interpreting S.A.E. numbers to denote comparative service suitability as well as comparative body. If two oils are labeled S.A.E. 30 it is being erroneously assumed that the two oils compare favorably in lubricating characteristics as well as body, an assumption far from fact. S.A.E. numbers are purely measures of rates of oil flow at a given temperature and have nothing whatsoever to do with lubricating value.

Summarizing the specifying of engine oils by S.A.E. numbers we can set up a few more "don'ts" in the selection of the tractor Diesel engine lubricant.

Do not select the oil for the engine by S.A.E. numbers alone. It is a known fact that some S.A.E. 40 oils may thin out to compare with an S.A.E. 20 oil under the cylinder wall temperatures. Again an S.A.E. 20 oil may thicken under low temperatures to compare with an S.A.E. 40 oil. Neither condition is to be desired in our engine lubricant. Again do not read oil quality, base, compounding or type into S.A.E. numbers. An S.A.E. 30 oil may be either a naphthenic or parrafin base oil or perhaps a blend of both. It may be a compounded oil containing undesirable elements, which, in service would tend to form corrosive acids and attack the metal of the bearings to no good end.

This matter of compounds in engine oils leads us to another "don't" that is very important. During the past year a growing number of lubricants have been placed upon the market to meet the peculiar demands of the high speed Diesel engine. The Diesel engine, because of its designed intention to develop compression pressures high enough to create combustion temperatures, places heavy demands on the lubricating oil. In certain types of Diesel engines temperatures created



● Full pressure lubrication is featured in this C. I. Case heavy-duty, valve-in-head tractor engine. A gear pump forces oil direct to main bearings.

around the top piston ring are sufficiently high to "cook" or "stew" the normal type engine oil, resulting in stuck and carbonized rings. The research laboratory of the refiners, to meet this condition peculiar of some high speed Diesels, developed compounds, which, when added to the engine will tend to lessen carbonization. The addition of some of these compounds, while helping to overcome the difficulties of high temperatures, definitely detracts from the stability of the oil itself. We find such oils must be changed frequently to avoid crankcase sludging and consequent fouling of bearings and oil feed lines. We also know that certain of these compounds will definitely corrode alloy bearing metals — a phenomena to be avoided in our gasoline engine.

The builder of the gasoline engine for tractor duty has successfully designed his engine to avoid the development of excessive cylinder temperatures. The lubricating difficulties of the Diesel are not the lubricating problems of the gasoline engine. There is no reason why especially compounded lubricants should be used in our gasoline engine. A straight mineral oil, of high quality, will meet every demand placed on it by our tractor gasoline engine. Nothing can be gained by using compounded lubricants — and much may be lost through their promiscuous use. What's sauce for the gander is not sauce for the goose, in this particular case. Thus, another "don't" for our engine oil:—Don't use engine oils that are compounded with ingredients effecting stability.

The selection of the proper bodied lubricant for the Tractor gasoline engine, bearing in mind the foregoing "don'ts", should be based on four conditions of service as outlined below.

1. ENGINE DESIGN

The engine builder will supply the S.A.E. number of the oil he recommends for new engines. Using this as one key, realizing what S.A.E. numbers actually indicate, the right bodied oil can be secured. Some engines demand lighter bodied oils because of small bearing clearances and tighter fits and those demands must be recognized.

Engine Oil Selection Chart

Normal Service	**Viscosity**	
Normal Loads		
Climatic Temperatures	@ 100°F	650" to 700"
Period of Operation	@ 210°F	70" to 75"
Severe Service		
High Climatic Temperatures	@ 100°F	950" to 1000"
Long Hours of Operation	@ 210°F	85" to 90"
Heavy Loads		
Low Temperature Service		
"0° - 32°F"	@ 100°F	525" to 575"
Heated Storage	@ 210°F	65" to 70"
	Pour Point	5°F maximum
"0° - 32°F"	@ 0°F	18000" maximum
Unprotected Storage	@ 210°F	55" minimum
	Pour Point	5°F maximum
Below 0°F	@ 0°F	7000" maximum
	@ 210°F	45" minimum
	Pour Point	5°F maximum

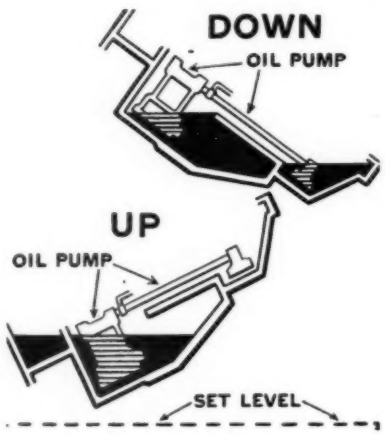
High Quality Straight Mineral Oils

2. CONDITION OF ENGINE

Engines in operation for some time will have looser bearing and piston ring fits. In cases of this sort the oil must be heavy enough to act as a seal against excessive consumption as well as a lubricant. Yet it must not be so heavy as to restrict ready flow to bearing and cylinder wall areas. Advice of a competent automotive lubricating engineer should be sought in determining the proper bodied oil to use.

3. CONDITION OF SERVICE

Engines operating in high climatic temperatures under full loads for long periods of time are considered under severe service. Here the crankcase temperatures are higher due to added climatic temperatures as well as higher operating temperatures. Conditions such as this call for heavier bodied oils than would be normally considered. The adverse is true for operating conditions in cold weather when lighter oils should be used.



● This diagram shows action of main and scavenge oil pumps on a Caterpillar "Thirty" in extreme up-hill and down-hill positions.

4. CONDITION OF STORAGE IN LOW TEMPERATURE OPERATION

In winter operation, where the tractor is stored without protection, light bodied oils must be used to assist easy starting conditions and assure quick and adequate oil distribution. Care must be taken to use oils under this condition, which, while light bodied at low temperatures, do not thin out dangerously when the engine reaches its normal crankcase temperature. Where the tractor is stored in a warm garage the use of lighter bodied oils is not so important.

Summarizing the selection of the lubricating oil for the gasoline driven tractor, the accompanying chart may be used as general guide.

The picture relating to the "don'ts" in the selection of gear lubricants is much the same as lubricant selection for the gasoline engine. The increasingly popular automotive use of the hypoid type gearing has created lubricating problems somewhat beyond

their satisfactory solution with straight mineral gear oils. We know in tractor work the loads created on gear teeth are severe. Since the loadings are concentrated along a "line contact" across the tooth face, the lubricant must be tough enough to resist film puncture and it must be heavy enough to resist being squeezed from between the meshing teeth, yet it must be light enough to readily circulate to the gear-wheel bearings. Most tractor drives utilize either worm or spur gearing with the teeth immersed in a bath of the lubricating oil.

The oil we seek for our tractor gears must not only have the lubricating characteristics mentioned above, but it must also have those characteristics that will permit long and continuous use. We can visualize the beating the oil takes in the gear case through being in a continual state of agitation at the same time it is subjected to aeration. Due to the development of heat, generated by the fluid friction in the oil itself, conditions are set up militating against the long and useful life of the lubricant. Heat plus agitation, in the presence of air, tends to oxidize and sludge gear lubricants. Unless our gear lubricant is well made and made to meet these destructive conditions efficiently, gear tooth pitting, scuffing or scoring usually occurs.

When gear tooth wear occurs, the lubricant is usually blamed and the operator casts about for a gear oil that will eliminate his difficulties. It so happens, thanks to the automotive hypoid gearing, gear lubricants have been developed which will eliminate gear tooth scoring. While this type of lubricant — usually called "extreme pressure type" — is the answer to our evil, its use creates a multiplicity of other evils. Unless the disadvantages of the extreme pressure lubricants are known along with their advantages, the tractor operator may find himself with more trouble on his hands than he bargained for.

Here again, as in the case of the gasoline engine, the tractor builder has supplied adequate sized gears, and made them of the best materials, and there is no need to use "trick" lubricants. High quality, straight mineral gear oils of proper body will efficiently handle the lubricating requirements of tractor gearing. Some gear lubricants contain compounds tending to increase film strengths that do not create hazards by their use. If other than straight mineral oils are desired for tractor use—the following "don'ts" should be religiously followed:

1. Don't use other than straight mineral gear oils unless explicitly specified by the builder or a qualified lubricating engineer.
2. Don't use compounded gear oils that contain compounds depreciating oil stability.
3. Don't use the extreme pressure type lubricant where bronze, copper, aluminum or brass are used in the gear assembly.
4. Don't use compounded gear oils where there is any danger of water contamination.

The specifying of gear lubricants is similar to that employed for engine oils. The Society of Automotive Engineers has set up classifications in gear oils. Here again we caution that S.A.E. numbers do not indicate straight mineral oils from compounded products or poor oils from good oils. They merely indicate a body classification. Below is the S.A.E. classification of gear oils.

As a guide to the selection of gear lubricants we offer the following chart. Since we must consider all tractor gears as being in severe service duty, it is only necessary to set up specifications for Summer and Winter temperature operation.

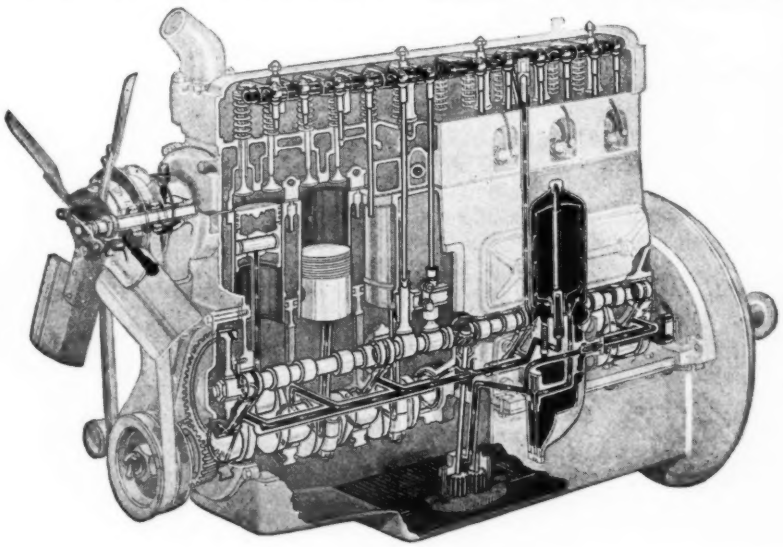
One more "don't" applying to the gear lubricant to be used in temperatures below —10° F. Some operators, rather than spending the money necessary to secure a proper light bodied prod-

(Continued on page 128)

Tractor Gear Oils

		Viscosity	
Summer			
Above 32°F	@100°F -	3200"	minimum
	@210°F -	180"	minimum
Winter			
10°F to 32°F	@ 0°F -	150000"	maximum
	@210°F -	80"	minimum
	Pour Point -	0°F	maximum
Extreme Winter			
Below —10°F	@ 0°F -	50000"	maximum
	@210°F -	60"	minimum
	Pour Point -	15°F	maximum

Use straight mineral gear oils except upon authoritative advice.



● This International T-40 Trac-TracTor engine has a full pressure lubrication system, including main, connecting rod, piston pin, camshaft, and rocker-arm bearings.

Out of the Cellar

R. W. Sidley handles variety of dirt moving jobs in Ohio with two ⅜-yard shovels. Camera catches one rig coming out after winding up one job.

HAVE you ever stood in a shovel-watching crowd and listened to the conversation as the shovel dug itself deeper and deeper into the basement hole? It isn't very long before some of the voluntary "assistant superintendents" begin to worry about getting the rig out when the job's done.

Pictorially, R. W. Sidley of Thompson, Ohio, here presents an answer. It might be a good idea for you to carry a supply of these pages to the job when you start a basement. Then, all you need do, when the crowd begins to wonder, is pass out the pictures.

They show the wind-up of a 550-yard cellar job in Painesville, Ohio. Total digging time was two days—longer than usual, for a job of that size, Mr. Sidley told us, because cramped quarters made it impossible to get trucks in fast enough. The basement is 8½ feet deep, 63½ feet long, and 29 feet wide. Material was clay. The ⅜-yard Bucyrus-Erie shovel, one of two similar rigs owned by Mr. Sidley, loaded to three 3-yard Ford dump trucks.

Shortly after work was started on this job, the building contractor made a change in plans which necessitated holding up the excavating temporarily. Rather than wait, the Sidley outfit put the shovel on its trailer, moved 10 miles to Willoughby, dug a 100-yard basement, and moved back to Painesville again the same day.

Immediately following the completion of this Painesville job, the 10-B started digging a quarter-acre private lake on a farm. This continuous activity is typical of R. W. Sidley, who handles all kinds of digging jobs in the territory bounded by Pennsylvania on the east, Cuyahoga county on the west, and extending south from Lake Erie for about 25 miles.

Mr. Sidley has a gravel quarry near Thompson. When his two ⅜-yard rigs aren't busy elsewhere, they work loading out gravel—used mainly for concrete work and road-building—from the home pit. This silica gravel is sold to contractors, state and county highway departments. It must be drilled and shot, and a ½-yard Brownhoist rig is used regularly for loading.

After "helping" get one of the 10-B's out of the cellar with our camera, we drove about 20 miles west, on Route 306, to where the second Sidley 10-B was loading highway gravel on a sub-contract.

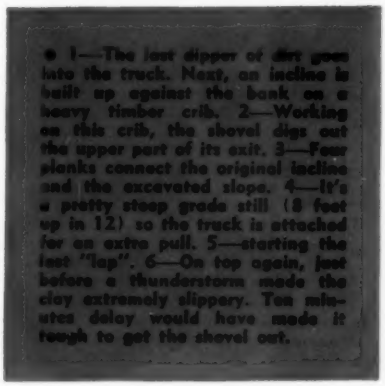
"A routine job," operator Harold Kline told us, "but you should have seen the one we just finished with this rig. We handled 16,000 yards of as tough dirt as I ever saw; a mixture of stone, red and blue clay, with some quicksand and moulding sand on top. Loading three trucks, the job took about nine weeks, with bad weather slowing the work materially. Output ran approximately 400 yards, truck measure, per 8-hour day.

"This rig is fast," Kline said, "and you can operate it eight hours in any kind of digging without getting tired."

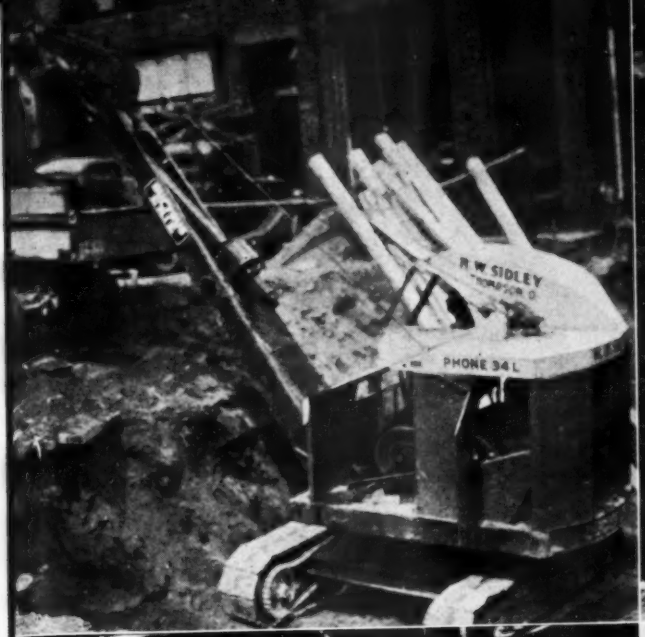
R. W. Sidley has been in the excavating business about four years, starting in hauling gravel in an old Dodge truck and trailer. In October, 1936, he got the first of his ⅜-yard shovels, and immediately found plenty of work for it to do. More than enough, in fact, so he got a second in the Spring of 1937, and has kept them both busy pretty constantly.

He tells us that 600 yards, truck measure, in a 9-hour day, is the best output he's hung up in gravel. About 6 bucket-loads give him a 3-yard load in that material. His average basement job runs around 200 yards, and he takes half a day to most of them.

Transporting the two shovels from job to job is handled with a special two-wheel trailer so designed that part of the shovel's weight is carried directly by the truck. With this set-up, he can move from job to job at 25 miles an hour without difficulty.



1—The last dipper of dirt goes into the truck. Next, an incline is built up against the bank on a heavy timber crib. 2—Working on this crib, the shovel digs out the upper part of its exit. 3—Four planks connect the original incline and the excavated slope. 4—It's a pretty steep grade still (8 feet up in 12) so the truck is attached for an extra pull. 5—starting the last "lap". 6—On top again, just before a thunderstorm made the clay extremely slippery. Ten minutes delay would have made it tough to get the shovel out.



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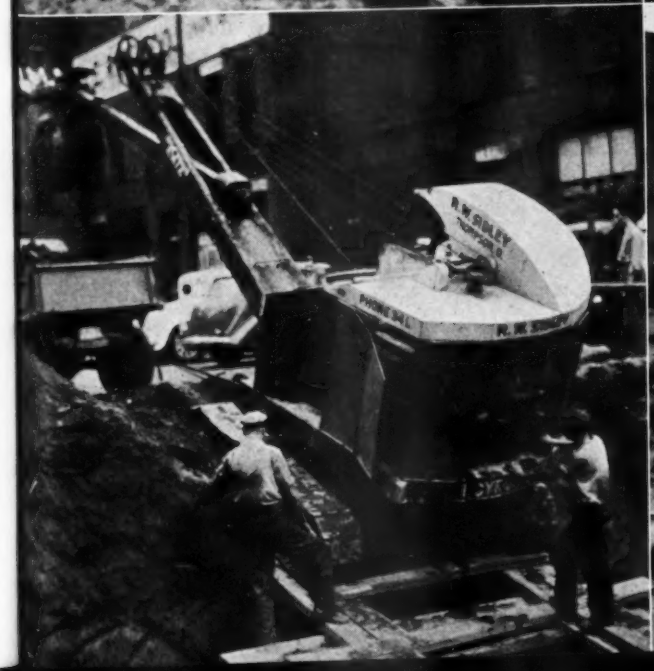


6

Tin Mining

On The Congo

Six 2¾-yard electric shovels and belt conveyors used to load out tin in African mine.

By G. E. SAVORY

THE well known Belgian Tin Mining Company, "Geomines," has large and important tin deposits situated at Manono, Katanga, Belgian Congo.

The deposits can be reached either from the West Coast, via Boma, Stanleyville and Muyumba, or via Lobito-Bukama, Muyumba, or by the East coast via Dar-es-Salaam, Albertville, Muyumba.

The mineralization consists of a large mass of decomposed pegmatite covered by a small depth of alluvial deposit.

A typical section of the property is as shown on the accompanying sketch.

The pegmatite is extremely compact and very abrasive.

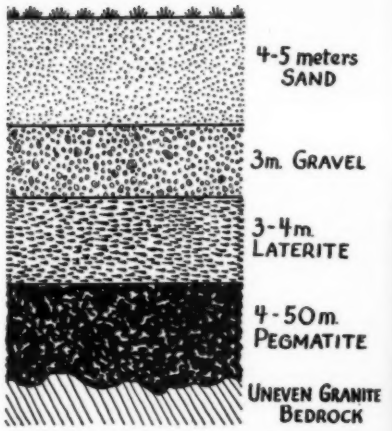
For many years Messrs. Geomines worked their property largely with hand labor which was abundant and cheap, employing some 8,000 natives. At the same time the possibilities of mechanical excavation were well known to them, and in fact they had a steam caterpillar-mounted dragline which they used for miscellaneous work around the mine.

Mechanization Begins In 1935

Of recent years labor has been more expensive, and the supply has been unreliable and subject to heavy seasonal fluctuations. Matters came to a head in 1935, and the Company decided that mechanization could no longer be postponed.

Having an abundant supply of electric power at high voltage from their own hydro-electric generating station, naturally electric shovels only were considered.

The engineers of Messrs. Geomines made a most extensive investigation of modern methods of excavation in mines, and also of modern methods of transporting the material from the point of excavation to the washing plant. The problem was no easy one to solve, since the material is hard and abrasive and liable to become very sticky in wet weather due to the band of laterite. In the locality of Manono, there is a heavy rainy season. The ground surface also is bad and treacherous. Furthermore the plans had to be drawn up so as to assure an output per shovel of some 600,000 cubic meters per annum.



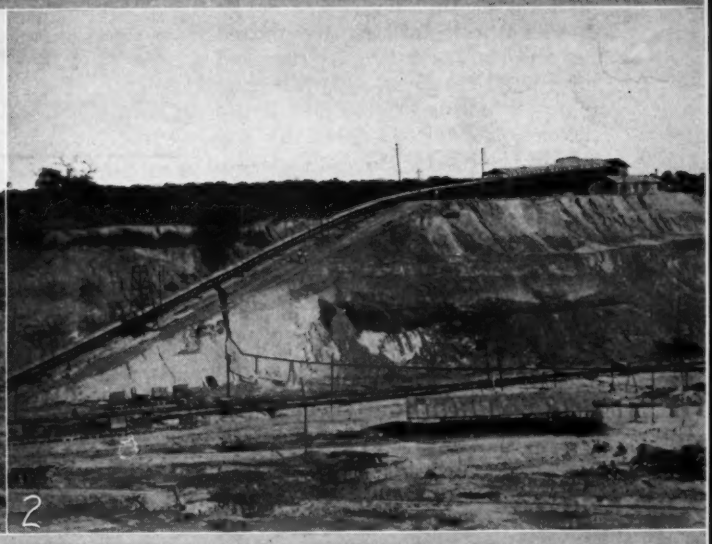
● The formation at this "Geomines" pit in the Belgian Congo is shown in this cross-section sketch.

The final plan adopted was made on the basis of utilizing belt conveyors for transporting the material from shovel to a permanent central washing plant. It was considered that for the special working conditions prevailing, belt conveyors would give the most economical results.

In 1936 the system of conveyors was put in, and two Ruston-Bucyrus 32-B, one cubic yard, chain-crowd electric shovels were installed for dealing with the sandy material at ground level. Four Bucyrus-Erie 85-B shovels were installed for excavating and loading through apron feeder hoppers to the conveyor belts. These shovels were equipped with full Ward Leonard electric control, and with special 2¾ cubic yard dippers, with patented inserted teeth, and with wide caterpillar tracks suitable for the bad ground.

Subsequently in 1937 two fur-

● The 2¾-yard shovels load to apron feeders which distribute material to conveyor belts. These hopper feeders are moved along the conveyor as the cut progresses.



1—The 2¾-yard shovels load to hoppers which feed the belt conveyor shown running up to foreground. Average cut is 10 metres deep, 15 metres wide and 150 metres long. 2—Belt conveyors carry material up to central washing plant. 3—One of the 85-B's moves its hopper to a new position. 4—Conveyors are extended in 10-metre sections as required. Note lights for night operation. 5—Two of these 1-yard Ruston Bucyrus shovels load sandy overburden to cars hauled by an electric locomotive.

ther 85-B machines were ordered, making six in all.

The apron feeders are moved up the conveyor belt as required by the 85-B shovels. The washing plant, which is located on the top level, utilizes the jib, the log washer, or the pan washer according to circumstances.

The mine is now working on the new plan, shown in the accompanying sketch.

The rubber conveyor belts are of 800 mm. width, and the main conveyor may be extended by sections as required. At present its length is about 150 m., and the lateral conveyor has also a length of 150 m.

The conveyor frame is of steel sections, consisting of two longitudinal I-beams securely cross-braced together and resting on a platform of wooden planks placed on the ground. The whole is built up with sections 10 m. long, so that it may be easily extended as and when required.

It will be seen that each 85-B shovel works in a section of its own, with washing plant and conveyor system. The shovel takes successive cuts 150 m. long and 15 m. wide and on the average 10 m. deep. Thus the volume of material in one cut is 22,500 cubic meters.

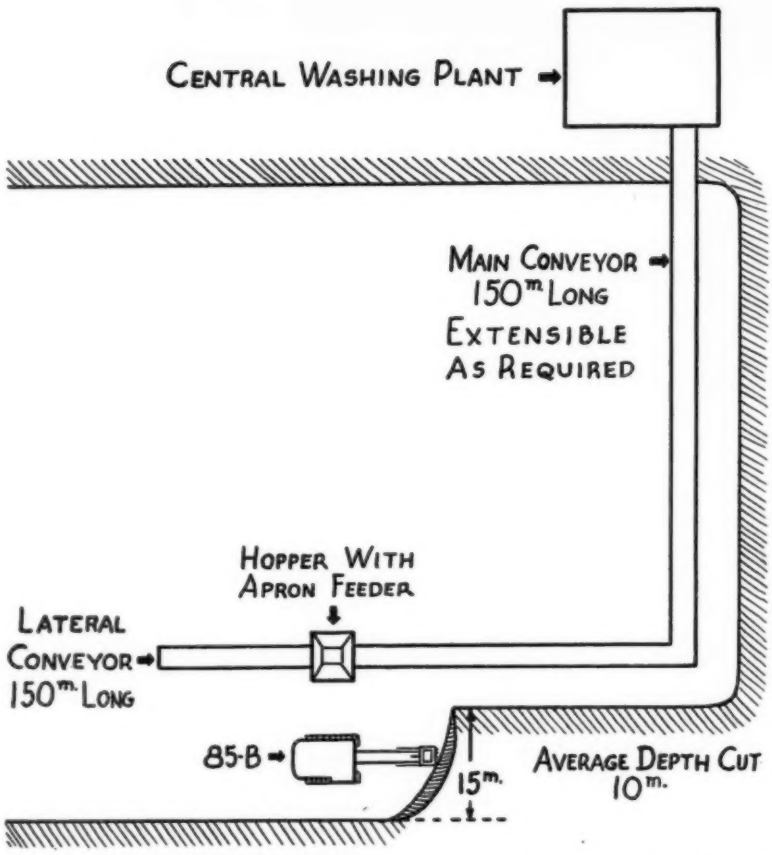
2,000 Meters Per Shovel Per Day

The shovels work 24 hours per day, in 3 eight hour shifts, out of which about 4 hours is allocated to oiling and greasing and attention to the machine. Hence there are 20 hours of effective work in digging; the output for one 85-B shovel over this period is 2,000 cubic meters bank measure.

At this rate of digging one cut 150 m. long is made in about 11 days, and it is then necessary to move over the conveyor for the new cut. This takes about 5 hours.

The performance of the whole of the installation has been very satisfactory, and has fully justified the careful advance planning of the Geomines engineers.

The 800 mm. conveyor belts which were expected to last only 12 months have already given more than 18 months' service without needing replacement.



Abrasive Material Hard on Teeth

The abrasive nature of the material naturally causes heavy tooth wear, and in fact teeth are changed every 3 days, and are rebuilt by welding. The ease of changing the inserted type teeth, and consequent time saving, is an important point in maintaining economical working even in this hard and abrasive digging. The laterite often breaks out in large cemented blocks weighing 4 to 5 tons, which have to be broken up by blasting. This is the only blasting which has to be performed.

Hoist ropes last from 5 to 6 weeks on three shift operation, that is to say about 60,000 to 70,000 cubic meters per rope, which may be considered as very satisfactory.

The machines quite often have to work on wooden mats, made up from 12" x 12" timbers, due to the treacherous surface of the ground.

The machines are all operated by natives, with two or three white superintendents, who visit each machine once in each shift to keep an eye on the maintenance and correct adjustment.

Year 'Round Operation

In spite of a rainy season in the Congo of 5 months in the year, work goes on steadily all year round. This is no mean feat when one takes notice of the temperatures prevalent at Manono:

Day—from 11 a.m. to 3 p.m. up to 35 degrees C.

Night—18 to 21 degrees C.

The rough tin ore (cassiterite) produced in the washing plant is purified in a finishing works, and then treated in an electric smelting plant, which produces tin of the highest quality. This tin is shipped to Antwerp, and from there is supplied to customers without any further treatment.

We are greatly indebted to the kind assistance in the preparation of this article given by Mr. Barzin, the Managing Director for Geomines, and Mr. Andre, engineer, in the head office in Brussels, and Mr. Charlier, engineer in the Congo.

More On Highways

Georgia

Gentlemen:

In reply to your recent inquiry relative to the Financial and Construction Program for 1937 and a forecast for 1938 of the Georgia Highway Department, I give you below the approximate mileage and estimated cost of the highway work for which contracts have been issued during 1937:

Paving and Bridges 506 Mi. Est. Cost $8,542,000.00
Grading and Bridges 600 Mi. Est. Cost $7,227,000.00
34 Grade Crossing Elimination Projects Est. Cost $1,424,000.00
10 Grade Crossing Protection Projects Est. Cost $59,000.00
Total 1106 Mi. Est. Cost $17,252,000.00
Total number of Bridges 74
Total number of Grade Crossing Elimination Projects 34
Total number of Grade Crossing Protection Projects 10

Georgia will have available for 1938 Construction Program approximately $11,000,000 Federal Funds, but no estimate has been made of the amount of State Funds which will be available for construction during 1938. However, it is believed that the funds for 1938 will be approximately the same as for 1937.

Yours very truly,
STATE HIGHWAY BOARD OF GEORGIA
By
(signed) E. A. Stanley
State Highway Engineer

Tennessee

The Department of Highways and Public Works reports a 1938 highway construction program of $7,130,170. Total construction expenditures in 1937 were $6,323,326.69. Maintenance last year required $2,247,592.65.

The 1938 program includes $5,097,417 of work on regular Federal Aid Roads. This includes 67.6 miles of grading and drainage to cost $1,499,620; 98.2 miles of paving at $3,112,464; 3 bridges and approaches at $347,533; 5 miles of roadside beautification at $58,900; and a planning survey to cost $78,900.

Only 40 per cent of anticipated secondary road expenditure of $1,074,000 has been programmed as yet. Included in plans are 24.753 miles of grading and drainage to cost $316,086; and 2 bridges costing $120,000.

The $958,753 grade crossing program includes three overhead projects at a cost of $268,372, seven underpasses to cost $630,000, and 10 crossing protections to cost $60,381.

In addition to the above, contracts awarded on which work had not started on January 1, totalled $1,049,524.60. Major portion of this was 27.102 miles of paving at $861,634.01. Grading and drainage contracts call for 9.578 miles at $134,322.08.

Under construction on January 1 was $3,149,870 of highway work, including: 41.827 miles of grading and drainage at $858,992.13; overhead crossings totalling $1,028,123.89; underpasses totalling $412,072; bridges and approaches costing $604,715.22; 8,705 miles of paving at a cost of $224,817.38.

Completed in 1937 were 62.114 miles of grading and drainage, 97.888 miles of paving; 17.575 miles of beautification; 15 grade crossing eliminations; and 10 bridges.

State Highway Expenditures and Federal Aid*

	State Spending	Federal Participation
1932	$817,000,000	$137,000,000
1933	666,000,000	186,000,000
1934	844,000,000	341,000,000
1935	713,000,000	215,000,000
1936	947,000,000	330,000,000

* American Road Builders Association figures. 1937 State disbursements are estimated somewhat larger than 1936, with not much change in Federal funds.

FEDERAL AID APPORTIONMENT

State	Sums Apportioned for Regular Federal Aid	Sums Apportioned for Secondary or Feeder Roads	Sums Apportioned for Elimination of Hazards at Railroad Grade Crossings
Alabama	$ 2,600,165	$ 520,033	$ 986,449
Arizona	1,785,984	357,197	315,619
Arkansas	2,132,790	426,558	865,366
California	4,735,268	947,054	1,825,553
Colorado	2,271,785	454,357	632,565
Connecticut	785,963	157,193	417,706
Delaware	609,375	121,875	243,750
Florida	1,669,497	333,899	692,981
Georgia	3,154,850	630,970	1,194,288
Idaho	1,538,178	307,636	404,755
Illinois	5,095,276	1,019,055	2,579,163
Indiana	3,063,178	612,636	1,270,383
Iowa	3,200,927	640,185	1,362,859
Kansas	3,283,179	656,636	1,271,424
Kentucky	2,299,072	459,814	894,871
Louisiana	1,791,188	358,238	777,845
Maine	1,089,359	217,872	338,735
Maryland	1,018,447	203,689	506,840
Massachusetts	1,725,964	345,193	1,021,971
Michigan	3,784,165	756,833	1,620,378
Minnesota	3,402,720	680,544	1,313,891
Mississippi	2,196,926	439,385	777,444
Missouri	3,774,930	754,986	1,496,333
Montana	2,553,444	510,689	653,267
Nebraska	2,579,115	515,823	871,434
Nevada	1,590,172	318,034	243,750
New Hampshire	609,375	121,875	243,750
New Jersey	1,662,041	332,408	972,568
New Mexico	1,993,177	398,635	419,200
New York	6,105,009	1,221,002	3,345,530
North Carolina	2,919,413	583,883	1,242,912
North Dakota	1,939,847	387,969	776,153
Ohio	4,517,858	903,572	2,087,464
Oklahoma	2,928,955	585,791	1,125,334
Oregon	2,048,413	409,683	565,844
Pennsylvania	5,291,737	1,058,347	2,826,864
Rhode Island	609,375	121,875	243,750
South Carolina	1,671,209	334,242	736,174
South Dakota	2,029,328	405,866	674,361
Tennessee	2,616,339	523,268	933,280
Texas	7,787,739	1,557,548	2,674,043
Utah	1,410,802	282,160	321,103
Vermont	609,375	121,875	243,750
Virginia	2,269,875	453,975	935,084
Washington	1,956,342	391,268	750,582
West Virginia	1,357,927	271,585	652,386
Wisconsin	3,030,337	606,067	1,220,638
Wyoming	1,559,860	311,972	331,769
District of Columbia	—	—	243,750
Hawaii	609,375	121,875	243,750
Puerto Rico	609,375	121,875	360,341
Total	$121,875,000	$24,375,000	$48,750,000

Bear With Us

A $345,000 contract is worth fighting for. In trying to get it, Salesman Williams goes into the stockmarket, jail and a night club. Bear with us and see for yourself.

By FREDRIC BROWN

Letter from D. Itch, President, the D. Itch Digger Co., to William Z. Williams, Suite 16, The Broken Arms, New York, N. Y.:

Dear Mr. Williams:

I was glad to hear from you and to learn that you are now in New York, particularly because there is a great favor I would like to have you do for me while you are there. I had intended sending one of our best salesmen, but at the various times you have sold our excavating equipment, you've had better success than any of them.

Some time ago the government of Abalonia, second-largest of the Balkan states, advertised in America for bids on a very large order of excavating equipment. We bid, of course, and are quite confident of getting the order, which will keep us going most of next season. Our only real rival on this deal, I believe, is Shovels, Inc., but I believe we underbid them.

The bids are to be opened next Saturday noon, and the contract awarded.

I believe that in our best interests, someone representing the D. Itch Digger Company should, meanwhile, contact Mr. Zabba Zahn, the Abalonian consul, to establish a friendly and personal relationship which will make the final awarding of the contract a real pleasure rather than a mere commercial duty.

In other words, Williams, as our representative, will you look up Mr. Zahn, and "show him the town"? Gain his friendship, as it were, for the D. Itch Digger Company? I don't think this is really necessary, as the awarding of the order seems to be on the up-and-up, but I would like to have it done. There is no question of bribery, purely establishing friendly relations.

Thanks in advance, Williams, for I know you'll do it. Send me a bill for your services and your expenses in entertaining the consul.

D. Itch

Letter from William Z. Williams, Suite 16, The Broken Arms, New York, N. Y., to D. Itch, President, the D. Itch Digger Co., Circle Center, Ohio:

Dear Mr. Itch:

Things are a lot more complicated than you imagine. I haven't seen Mr. Zahn yet, and maybe I won't get to, because it's an awful hangover I got, but it was worth it. It was even worth the twenty dollars I gave the girl in the red trunks at the Green Hat, because if it hadn't been for her, I wouldn't have known that the Shovels, Inc. people underbid you.

But that's getting ahead of my story, for unless I start at the beginning, you won't even understand why I handcuffed Mr. Rogers to the telephone pole out in Rutabaga County.

You see, Mr. Itch, I didn't go right around to see Mr. Zabba Zahn, the consul, and maybe it's a good thing I didn't, or I might have stopped there and we would have been lulled to a sense of false security about the bid.

I wanted to get all the angles on it I could first, so I went to see Mr. Inchweiler, because I knew he was a big stockholder in your company and a member of your board of directors. I was surprised at the size of his offices and the fact that he runs one of the biggest stock brokerage houses in New York.

Mr. Inchweiler was glad to see me, and said he had heard a lot about me and my speculations in Arizona and in Florida from you and that if I wanted to invest any of the proceeds he'd be glad to extend me the services of his concern.

He seemed puzzled about the mission you had offered me, and wondered why you hadn't asked him to contact the consul, but he said he was awful busy and just as glad you didn't and he gave me a lot of details about it, and a few tips on how to handle it.

Then he took me out to the main room and introduced me to a Mr. Potts and told Mr. Potts that if I wanted to make any investments he should take care of me and that I was good for it.

And when he left, Mr. Potts asked me if I was a bull or a bear, and I kidded right back and told him I couldn't bear to be a bull, and he laughed heartily and told me, "Well, Mr. Williams, if that's the case I hope you'll bear with us. What are you interested in selling?"

● "... like a clam until the cigarette girl came around."

I told him I was interested in selling shovels, and he still kept on kidding and asked me if a thousand would be about right and I told him to make it two thousand and he said okay.

And it wasn't until this morning that I got a formal notification in my mail at the Broken Arms that he had sold me short on a couple of thousand shares of Shovels, Inc. And the worst of it is, Mr. Itch, that word must have leaked out even farther than just to me that Shovels, Inc. had underbid us, because the stock is two points up on the market, to 14½, and that's four thousand dollars gone!

But that's getting ahead of myself again. After I left Mr. Inchweiler I went around to Shovels, Inc., because you said they were our closest rivals on this deal. and I told them I was a buyer from South America and got them to show me around and tell me about their products and what-not.

And a Mr. Rogers, who seemed to be their crack salesman, started out to sell me some shovels, and as it was late in the afternoon, we went to dinner together, and to a burlesque show and then to a night club and about midnight I could see that Mr. Rogers was beginning to feel his licker, so I got him to drink some more, and then I mentioned D. Itch Diggers, and he got confidential and laughed and started to tell me how they were putting one over on D. Itch Diggers on a big contract, and then he remembered himself and suht up like a clam.

Until the cigarette girl came around. She had on red trunks and not much else and had a figure like Henry Ford's income tax, and Mr. Rogers fell for her in a big way. I slipped her a twenty while he was watching the floor show and told her to help me get him pie-eyed and she sat with us a while and persuaded him to drink three more Martinis and a side-car, and then he really opened up and spilled the works.

● "How am I? xz!y?!"

● "I remember handcuffing him to a telephone pole."

Someone in your organization, Mr. Itch, must have given your bid away to Shovels, Inc. It seems they knew your bid was for $345,600, and so they made theirs for $345,595. Five dollars difference, but they'll get the contract!

Luckily, Mr. Rogers had passed out cold, so I had the doorman help me pour him into my car and I drove miles out of New York into Rutabaga County and I remember handcuffing him to a telephone pole (but I can't remember where I got the handcuffs) with some idea of keeping him out of the city until I did something about straightening out the difficulties.

But I must have been slightly inclined to feel the licker that I had drunk, too, Mr. Itch, for coming back I must have got into the wrong car somewhere along the road, because the police tell me that when they arrested me I was driving a steam roller on the wrong side of the road and that I kept insisting that the British were coming.

So you see, Mr. Itch, I'm in jail in Round Corners, N. Y., about ninety miles out of New York City, and it's now already late Friday evening so I don't quite see what I can do. I had thirteen cents when I was arrested out of two hundred dollars that I started out with, but the police are letting me send you this special delivery with the thirteen cents. They wouldn't let me call you up. And one of them who was going in to New York City offered to call a friend of mine who is a lawyer there and tell him I was in trouble, so I guess I'll get out eventually.

And I managed to see a newspaper, too. Shovels, Inc. has gone up another point, which means two thousand bucks more that I'm out. But maybe everything will come out okay.

Optimistically yours,
William

Telegram from D. Itch, President, the D. Itch Digger Company, Circle Center, Ohio, to William Z. Williams, care of Jail, Round Corners, N. Y.:

YOU INSUFFERABLE SAP WHY DIDNT YOU WIRE COLLECT YOUR SPECIAL DELIVERY LETTER ARRIVED TWELVE TEN SATURDAY TOO LATE FOR ME TO ENTER NEW BID STOP CONGRATULATIONS ON GREATEST BLUNDER IN A LONG CAREER AND LOSS TO US OF THREE HUNDRED FORTY FIVE THOUSAND DOLLAR ORDER STOP CONSIDER ALL FRIENDLY AND BUSINESS RELATIONSHIPS BETWEEN YOURSELF AND US SEVERED STOP BAH

D ITCH

Item appearing in New York Herald-Gazette, Saturday, February 5th:

ROUND CORNERS, N. Y.—(AP)—William Z. Williams, excavating equipment salesman, who resides at Suite 16, Broken Arms, New York City, was fined $100 and sentenced to three days in jail here on a charge of drunk and disorderly conduct and resisting an officer at night court here late Friday night. "We are going to punish to the full extent of the law," said Judge Diedenbach, "those New Yorkers who think they can make a playground of Rutabaga County." In addition to his sentence, Mr. Williams is making restitution for the seven-

(Continued on page 122)

EXCAVATING ENGINEER

A Monthly Publication
Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
South Milwaukee, Wisconsin

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Grievances

"Great oaks from little acorns grow."

Most employers have given a great deal of thought and effort to the major features, the "great oaks," of labor relations. Fair wages and working hours, good working conditions—all employers today want to give these to their men; want to give them as fully as possible without raising prices to the point where customers won't buy.

These major factors, however, are not the whole story. Other, less emphasized labor relations factors often do not receive the attention they deserve. Grievances, for instance, are acorns from which may grow major labor troubles. Careful thought as to the best method for handling grievances will pay dividends to everyone responsible for supervision and directions of workers.

Details of the "best" method will, of course, vary with different organizations and different jobs, but many important factors have a universal application. A grievance may start out merely as a minor irritation, but the longer it continues unsettled, the bigger it grows in the workers mind, and the more potential dynamite it packs for the employer. This is equally true whether the grievance is a well-founded one, or entirely imaginary. It is even true of the grievance which exists and has not been complained about. The first thing to be sure of, then, is that grievances be handled promptly. They may seem trivial, but they are important to the workers—and therefore important to the boss.

In settling grievances fairly, it is vital to get all of the facts. A thorough investigation of an irritating situation helps convince the worker that his boss is sincerely interested in straightening the trouble out—and wants to do the job right. This is in addition to the necessity of complete understanding as a basis for decision.

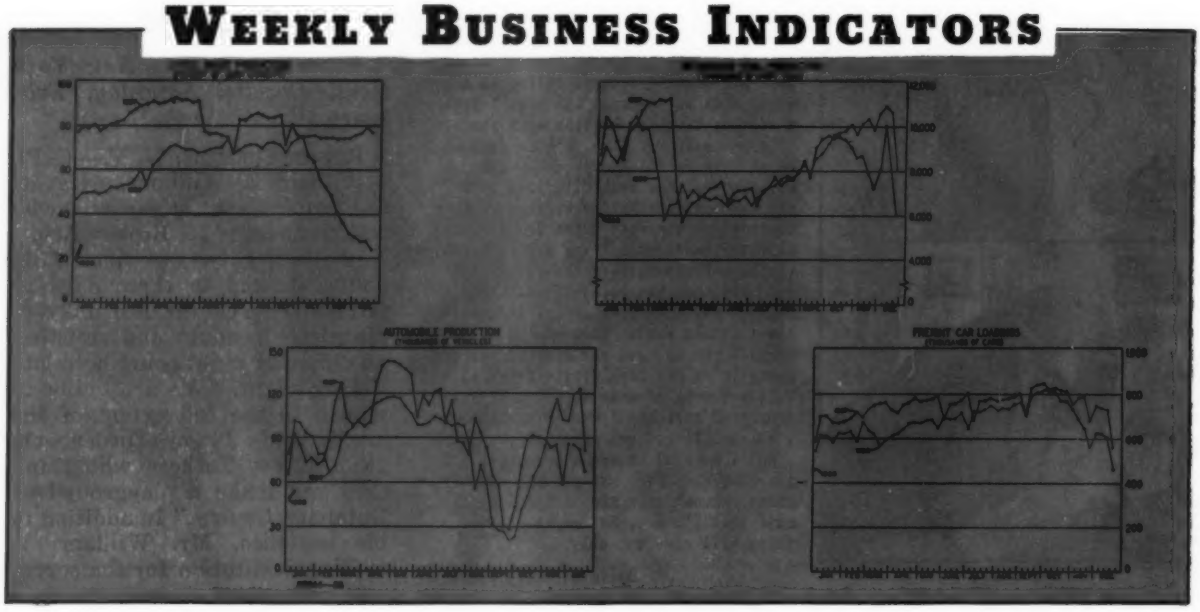
The manner of receiving complaints itself has an important bearing on the success of their settlement. Workers should understand that the responsible person is always willing to listen, and anxious to adjust any real difficulty. Readiness to listen, and listen with a friendly attitude, brings complaints out in the open where they can be settled with mutual satisfaction. In this same connection, it is important not to let grievance discussions grow into arguments. Arguments settle nothing but the certainty of each arguer that he is right. On the other hand, a calm, thorough discussion makes the worker realize his case is getting careful, thorough consideration. If the decision must go against him, this consideration will go far towards making him realize that the decision is based on facts, not merely authority or prejudice.

Whether the answer to a complaint is to be "yes" or "no", it is vital that the answer be given definitely and within a reasonable time. Stalling on a grievance merely makes the irritation grow in the worker's mind and makes eventual settlement more difficult.

Willingness to admit mistakes, and to give the worker the benefit of the doubt in borderline cases are important goodwill builders. Other obviously important considerations in grievance handling are: never allowing the same cause for a complaint to happen twice, ability to learn from each situation, and best ways to eliminate grievance causes.

Editor's Note: For a further discussion of this subject see "How To Handle Grievances" by Glenn Gardiner, published by Elliott Service Company, 219 E. 44th Street, New York, N. Y.

Weekly Business Indicators



1937 Construction 10 Per Cent Above 1936

The fourth year of construction industry recovery closed in the middle of a moderate recession, but with a definite gain over the preceding year, according to Thomas S. Holden, vice president in charge of Statistics & Research of F. W. Dodge Corporation. Recovery gains over 1936 were approximately as follows: an increase of 15 per cent in dollar volume of residential building; a dollar increase of 21 per cent in nonresidential building; an increase of 40 per cent in public utilities construction; and a decrease of 20 per cent in public works construction.

From the point of view of ownership and financing, the program of the year 1937 showed a 34 per cent increase over 1936 in dollar volume of private building and engineering work, partially offset by a 15 per cent decline in public work of all kinds, resulting in a general construction volume increase of about 10 per cent. The final 1937 total for construction contracts awarded in the 37 Eastern States will be $2,900,000,000 or a little over, compared with $2,675,000,000 in 1936. Each month of 1937 through August gained over the corresponding month of 1936. Declines after August were very moderate: September contracts dropped 12 per cent below the preceding September; October contracts were 11 per cent under the preceding October; November contracts were 5 per cent under November 1936; advance figures for December 1937 indicate a contract volume equal to or slightly greater than the December 1936 volume.

The recession in construction has not, up to the present time, shown any indications of a depression of a major character. It has brought, however, a realization of the fact that rosy expectations of a rapidly rising speculative boom in the real estate and residential building had no foundation, and of the equally pertinent fact that the great potential market for residential building is in low-priced housing. The home-building industry, to realize fully its potential market, must gradually and progressively solve its major problem of cutting the cost of the finished product.

Economic and political stimulus to renewed recovery is the major need now, says Mr. Holden.

A. Bruce Ritchie

The tragic death, on December 27th, of Major A. Bruce Ritchie, general superintendent of the Sullivan Mine of the Consolidated Mining & Smelting Company was a great shock to his innumerable friends and co-workers.

With his assistant general manager, William Lindsay, "Bruce" Ritchie was making a tour of the mine. A blast in another section of the mine loosened rocks, one of which struck Major Ritchie, killing him instantly. Mr. Lindsay was injured, but not seriously.

To those who knew, and loved him, it is difficult to pay sufficient tribute to Bruce Ritchie. Because it gives an idea of the man, and his record, we quote a letter written to the Nelson Daily News by S. G. Blaylock, vice-president and general manager of the Consolidated Mining & Smelting Company of Canada:

"In the tragic death of Major A. Bruce Ritchie, the Consolidated Mining & Smelting Company has lost one of its most outstanding officials.

"Bruce, as he has been known to everyone, was not only one of the most able men on the company's staff, but was, without doubt, the best known and most loved man in the organization.

"He came to Trail to work in the assay office as soon as he left McGill university 32 years ago. He went with me to the Hall Mines smelter in Nelson in 1907, and then to Moyle in 1908. He went to the coal mines at Hosmer for a year, and then spent a couple of years as underground superintendent at the Molly Gibson mine in 1912.

"He was one of the first to enlist in 1914, and served throughout the war, mainly with the tunnelling operations.

"On his return from the front he came back to the mining department of the C. M. & S., later becoming assistant to Mr. Archibald, vice-president in charge of mines. When Mr. Montgomery was transferred to the Montreal office, Mr. Ritchie succeeded him as general superintendent at Kimberley. Mr. Ritchie's place will be hard indeed to fill.

"While his work will undoubtedly be carried on, there will be an ache in the hearts of thousands of C. M. & S. employees from all ranks. Bruce had no enemies. He has never been known to do a mean trick to anyone.

"Our deepest sympathy goes out to his wife and daughter, who filled such a large place in his life.

"(Signed)
"S. G. Blaylock"

I. E. Stevenson

Dirt-moving executives, distributors and equipment manufacturers from coast to coast were shocked to learn that I. E. Stevenson was one of the group meeting death in the tragic airplane crash in Montana on January 10. Advertising manager of Pacific Builder & Engineer, "Steve" was on his way to the Road Show at the time of the fatal crash.

He was born June 17, 1895 at Sioux Falls, South Dakota. Attending the University of Minnesota he had a part-time job on the advertising staff of the Improvement Bulletin, which was his introduction to the excavating field. He continued his association with this publication until 1925, when he transfered to the west coast and the position with Pacific Builder & Engineer which he held at the time of his death.

Through his numerous cross-continent trips, "Steve" made many friends throughout the country, his honesty, loyalty, dependability, and quiet, kindly humor making him loved whereever he went. He liked people; people liked him, and will miss him.

He is survived by his widow, three children, a sister, and a brother.

SHIFT YOUR JOB *into High* WITH..

Rocky and tough is the clay on Sandy Hites Construction Company's highway relocation job near Poplar Bluff, Missouri, but not too rocky nor too tough for the **FASTER POWER** of Allis-Chalmers tractors. Six A-C tractors are working on this project. They keep it going in *high* from start to finish. They start instantly and go right to work—no fussing with or waiting on auxiliary motors. They move faster because they have more and higher speeds—that means greater flexibility and the right speed for every task. A-C tractor design eliminates speed-robbing deadweight—extra payload is gained by saving tractor weight. Finally, they have ample reserve power for lugging in tough going at low speeds, plus **FASTER POWER** in those higher speeds at which you do 90% of your work—watch that Faster Power gain extra trips hourly over ordinary, slower-moving tractors. It's that Faster Power which enables A-C tractors to maneuver easily and quickly in tight spots, to climb steep grades faster, to move big yardages in a hurry, to cut earthmoving costs. Shift your job into high with this **FASTER POWER**. Ask your nearest A-C dealer for the facts.

Two Model L-O's and L-10 Gar Wood Scrapers cutting and filling on Sandy Hites' job near Poplar Bluff. Fill is compacted by a Model K and Blaw-Knox roller.

MORE FOR YOUR MONEY FROM

Faster Power

When you buy A-C tractors you get more usable power for your money because there is no excess weight to use up power or to figure into the cost. As a result the first cost of **FASTER POWER** is lower than that of ordinary tractors. You get more work from your fuel and lubricating dollar, too, because A-C Controlled Ignition Oil Tractors develop a full, even flow of power on *any clean Diesel fuel or furnace oil*—no extra-cost, premium fuels or special lubricants are required. Lower fuel costs, lower first cost, **FASTER POWER**—from these you get lower-cost yardages, consequently *more profit.*

STER POWER

Here highway shoulders are broadened in a hurry as the A-C Model K and 5-yard Continental Scraper (one of two such outfits on this job) end-dump over the edge of the fill.

This Model K does double duty by levelling with a Baker Bulldozer and rolling the spread material with a Blaw-Knox roller.

ALLIS-CHALMERS

TRACTOR DIVISION—MILWAUKEE, U. S. A.

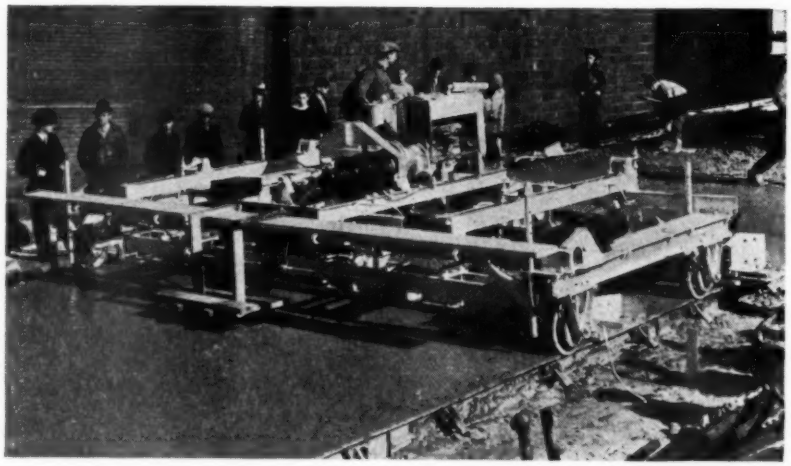
Controlled Ignition OIL TRACTORS

Equipment you ought to KNOW ABOUT

"99" Motor Grader

The Austin-Western Road Machinery Company of Aurora, Illinois, exhibited for the first time at the Cleveland Road Show a new motor grader, the "99." The outstanding features of this machine are: power applied to all wheels, and steering through the front and rear wheels whereby traction can be controlled to increase blade output. The conventional idling front wheels are not used, but in their place are power-driven front wheels which are the same diameter as the rear drivers. The machine is equipped with four wheels, and each of them drives and steers. Either single or dual tires may be used. Every adjustment on the machine is controlled by hydraulics, including front and rear steering, extending or retracting the working blade without disturbing position of circle or "floor plane" of road, raising the blade and scarifier, and any other required adjustment.

The "99" is furnished with either Gas or Diesel motors, as desired, and optional tire equipment is available. The standard moldboard is 13 feet long. The scarifier folds up out of the way to avoid the windrow or load carried by blade. The machine can be fitted with special attachments such as a scarifier, bulldozer, backsloper, snow plows, wings, etc.

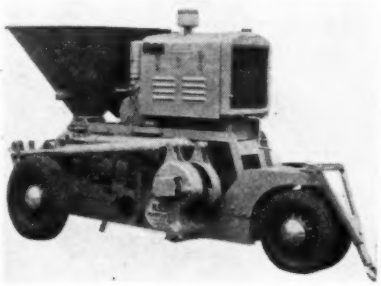


Paving Finisher

Blaw-Knox Company, Pittsburgh, Pennsylvania, has developed a gas-electric concrete paving finisher said to be able to strike off and surface finish 2000 to 2400 feet of pavement per day in 18- or 20-foot widths. Two rocking surfacers smooth the concrete surface as the machine travels slowly along the road forms. Concrete poured from the paver is leveled off by the same method. A gasoline motor generates power for the electric operating motors.

New Concrete Mixer

Chain Belt Company, Milwaukee, Wisconsin, is now manufacturing a new Rex 160 Pumpcrete. This Pumpcrete has an hourly capacity capable of handling a half cubic yard mixer. It is designed along the same principles used on the larger models and is mounted on pneumatic tires which permit



it being towed from job to job, as the ordinary truck used on a construction project has ample power for pulling it. The power for the 160 model is supplied by a four-cylinder gasoline engine. The rated capacity for this size Rex Pumpcrete is from 15 to 20 cubic yards per hour. A six-inch diameter pipe line will most generally be used with this new model.

Shank and Bit Punch

A recent development in rock drill sharpening equipment, a new Shank and bit punch, has just been announced by Ingersoll-Rand Company, Phillipsburg, New Jersey.

New features include more convenient location of operating levers, safety guard for punch, and improved design, facilitating inspection and reducing breakage of punch pins.

This punch, mounted on a sturdy one piece bracket is adaptable to all recent I-R Sharpeners.

Davey Compressor

Announcement of a new 315 ft. side by side compressor introduced at the Cleveland Road Show was made recently by the Davey Compressor Company, Inc., Kent, Ohio.

The new unit has a shorter turning radius than any other compressor of this size now on the market, according to Davey engineers.

Streamlined, it is 127 inches long; 58 inches wide, and 70 inches high. In it are incorporated all of the patented features of Davey air-cooling including the multiple V-belt drive.

Diesel Engine

Featuring the Cummins Engine Company's exhibit at the Cleveland Road Show, was their 500 hp. VL-1200 model Diesel engine produced for industrial or locomotive service. The VL-1200 is a vee-type engine with six cylinders in each of the two banks. Its rated power is developed at 1000 rpm. This new model Cummins Diesel is particularly suited for large shovels, draglines, portable construction power plants, gravel plant operation, locomotive service—and other industrial services according to the manufacturer.

Automatic Stripper

A new Automatic Wire Stripper that will not crush stranded wire, has been added to the "E-Z" Wire Stripper line of the Ideal Commutator Dresser Company, 4104 Park Avenue, Sycamore, Illinois.

This new Stripper is provided with a lever, which stops the return of the arms until the wire is removed after stripping, then it is snapped quickly back to normal.

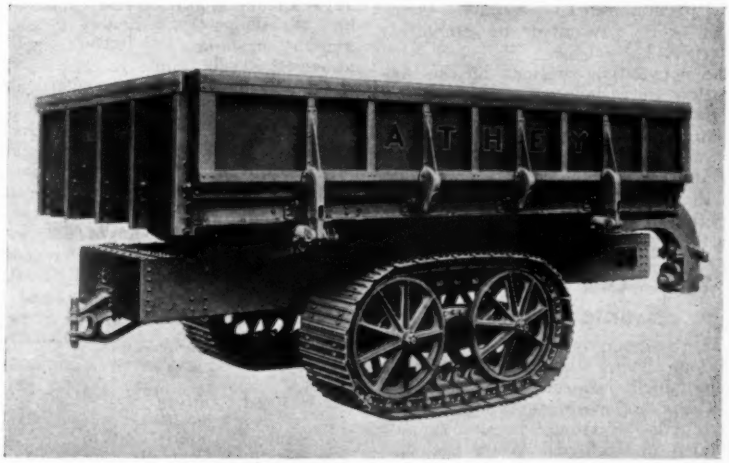
Forged-Trak Trailer

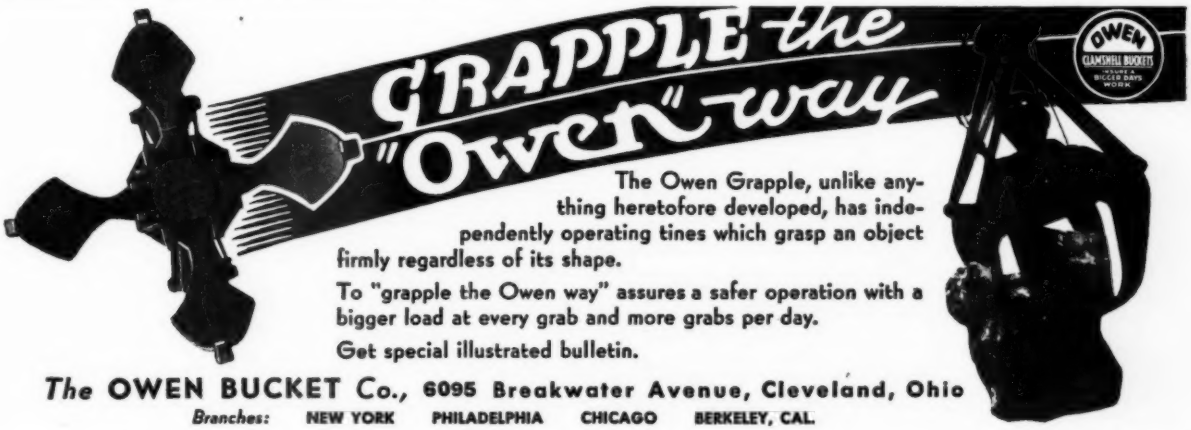
Recent additions to the line of Athey Forged-Trak Hauling Equipment, are two dump trailers announced by Athey Truss Wheel Company, Chicago, Illinois. Both units are mounted on Athey Forged-Trak Wheels.

The 18-yard Athey Forged-Trak Bottom Dump Trailer has a fully automatic mechanical windup, mounted in the front end of the frame. It is spring mounted on the axle. The 16-yard Athey Forged-Trak 2-Way Dump Trailer is a general utility unit for the quick handling of dirt, rock, sand, or mixed materials. This unit dumps to right or left.

Portable Electric Drill

Reduction of weight and size to half the former standard for half-inch capacity drills, without, it is claimed, sacrifice of strength or power, is the primary engineering accomplishment in the new half-inch electric drill just announced by the Independent Pneumatic Tool Company, 600 West Jackson Boulevard, Chicago. This drill, known as the THOR U44, weighs nine pounds and is but twelve inches in overall length. It is a heavy-duty tool, designed for continuous service. Its light weight and small size give it the portability and carrying ease necessary for maintenance work.

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The Owen Grapple, unlike anything heretofore developed, has independently operating tines which grasp an object firmly regardless of its shape.
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Shots from the FIRING LINE

Record Road Show Attendance

A total attendance of between 25,000 and 30,000 made the 35th American Road Builders' Association Convention and Road Show, held at Cleveland January 17-21, the largest in history. The highway-minded gathered from each of the 48 states, and representatives from each of the five continents were present. On Sunday, the day before the Convention and Road Show opened, advance registration was 4,000. January 17, registration was 7,000, and 11,000 clicked through the turnstiles at the Public Auditorium in Cleveland. An attendance of 13,000 was estimated for January 18.

Once in the Auditorium, representatives saw the largest, most modern exhibit of highway building equipment ever gathered in one place. The exhibits crowded 6½ to 7 acres of floor space, topped $10,000,000 in value.

Emphasis was on modernity, with new units, new improvements and developments of previous types of equipment prominent. The displays themselves were presented in attractive modern style.

The convention sessions of the Association were devoted to a thorough discussion of major problems of road-building, with safety sharing the spotlight with technical factors of construction and maintenance.

If the 1938 Road Show-Convention is any gauge, modern highway building is in for a good year and a good future.

37-Year Old Stripper Still Going Strong

The accompanying picture shows the first long boom stripping shovel built in England. It was constructed by John H. Wilson & Sons of Liverpool in 1900 for Lloyds Ironstone Company, now Stewarts and Lloyds. When the machine had been working three or four years, A. R. Grossmith, Chief Mechanical Engineer for Lloyds at that time, completely redesigned it by building a larger truck frame to give the machine more stability and enable it to operate at a larger radius, with a greater bucket capacity.

The original boom was retained, but reconstructed so it could take longer dipper sticks operated by a rope crowd. Wire rope slewing gear was also used on this machine. Grossmith designed and fitted to the dipper a cast steel lip with inserted teeth.

The photograph shown here was taken in the summer of 1937 at which time the stripper was averaging an output of 4,000 yards per week. Costs are low, as all capital charges have long since been written off, and maintenance charges are almost negligible.

This stripper has been in practically continuous use since 1900, except for the period of its reconstruction.

It is interesting to note that the first long boom stripping shovels in the United States were built in 1899 for phosphate mining. In that year the Vulcan Steam Shovel Company built two "Vulcan Phosphate Specials" for the Berkley Chemical Company. Seven more of these long boom phosphate stripping shovels were built in 1900. The first long boom coal stripper built in the United States was also a Vulcan, and was constructed in 1908.

1937 Sets Dredging Record at Fort Peck

The 1937 dredging season at Fort Peck, Montana, where the Army Engineers have reached the final stages of construction on the world's largest hydraulic fill dam, broke all previous records for this type of work. Recent survey cross-sections show that 31,672,400 cubic yards were retained in place in the dam this season. Additional surveys and computations for subsidence and shrinkage will probably boost the amount credited to 1937 operations above 32,000,000 cubic yards.

Compared with 28,000,000 cubic yards for 1936 and 21,000,000 cu. yds. for 1935, the current year's work is quite remarkable. The reason it is an outstanding performance is because the 15 per cent increase over 1936 production, using the same equipment, was made against opposing factors of closure and diversion of the river (requiring the shifting of all floating equipment), longer pipelines and increased "head," or lift, for the material handled.

The recent surveys show a total of 82,320,400 cu. yds. in the dam. Nearly 3,000,000 yds. of this are in the dike and the remainder in the 9,000 foot wide river valley. About 23,000,000 cu. yds. remain to be placed next year to complete dredging operations at the Project, and to bring the rest of the dam to a uniform level, 242 feet above the old river bed.

This year's yardage was distributed as follows: 2,680,400 yds. on the left bank, 10,569,700 yds. on the right bank, 2,441,400 yds. in the upstream berm, 204,700 yds. in the downstream berm and 15,776,200 cu. yds. in the closure section. The latter quantity in the old river channel section of the dam was placed between June 24th and November 12th.

The 1937 dredging season was the longest it has been possible to record at the project, 249 days, as against 205 days for 1936 and 194 days during 1935.

From May 1st to October 21, inclusive, fill material went into place in the dam at an average rate of 5,900 cubic yards per hour, day and night. This is nearly 100 yards a minute, equivalent to 25 average dump truck loads every minute, a physical impossibility by such a method.

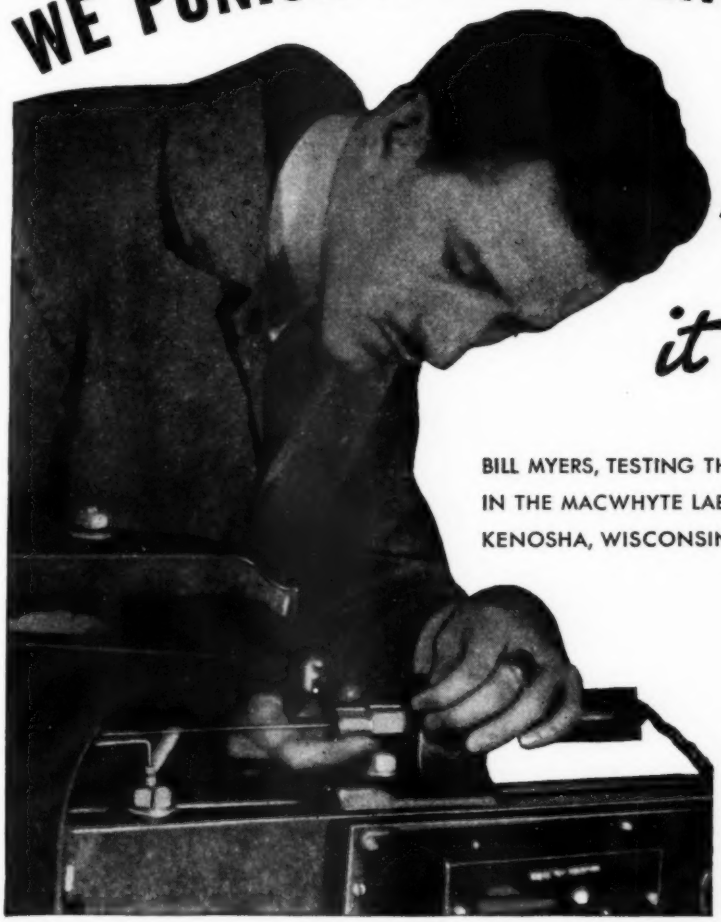
Never before in the history of the world has man placed material into a single structure in any such quantities. To the people of the nation it demonstrates forcefully the ability of modern engineering equipment to do earthwork.

Deer Creek Dam Bids Called

Secretary of the Interior Harold L. Ickes has called for bids for construction of the Deer Creek Dam and railroad and highway relocation for the

WE PUNISH A WIRE TEN MILLION TIMES

..and still it won't BREAK



BILL MYERS, TESTING THE FATIGUE LIFE OF WIRE IN THE MACWHYTE LABORATORY, KENOSHA, WISCONSIN

"That sounds like a lot of punishment," says Bill Myers—Macwhyte Metallurgist—"but this Haigh Robertson Fatigue Testing Machine actually rotates the wire, and through this rotation, subjects the wire to bending stresses. These bending stresses are repeated 10,000,000 times without failure of the wire. Then we're sure the wire will really resist fatigue on your job.

"Fatigue has always been one of wire rope's worst enemies. Every time a rope passes over pulleys, or twists, or when it's coiled on a drum, a condition of fatigue is set up. Fatigue can actually fracture some of the wires in a rope even when the breaking strength hasn't been reached.

"We've made a lot of progress in checking fatigue here at Macwhyte. By constant testing and experimenting we've found out how to make wire with the highest possible fatigue resisting properties. *That* means when you buy Whyte Strand PREformed, you get a wire rope that gives the best of service."

LOOK FOR THE *Whyte Strand*

MACWHYTE WHYTE STRAND IS *BETTER* BECAUSE IT'S MADE BY SPECIALISTS

MACWHYTE COMPANY
KENOSHA, WISCONSIN
Manufacturers of wire rope and braided wire rope slings. Distributors and stock throughout the U. S. A. for quick service.
NO. 317

MACWHYTE

Whyte Strand - PREformed

THE WIRE ROPE WITH THE INTERNAL LUBRICATION

For your convenience in writing to the Macwhyte Co., you will find a card bound in this issue.

Provo River reclamation project, Utah.

The work is to be located about 16 miles northeast of Provo, Utah. It will be part of the Provo River reclamation system, and will bring the benefits of irrigation to some 40,000 acres of land which now are under cultivation but which are in need of a dependable water supply.

The Deer Creek reservoir will run along the Provo River on the west side of Jordan valley. Lands to be irrigated stretch for approximately 15 miles toward Salt Lake City.

In addition to the direct irrigation benefits, the project is designed to afford an increased supply of water for the towns of Provo, Orem and Salt Lake City.

Bids will be opened February 10, 1938 at 10 a.m. A construction period of 1,350 days will be allowed.

Construction of the Deer Creek Dam will call for excavation of some 2,800 cubic yards of earth for fill in the dam. It also calls for 2,500,000 cubic yards of earth fill in the dam embankment, with 30,000 cubic yards of sand, gravel and cobble fill for the dam. Also involved will be the placement of 1,932,000 pounds of reinforcement bars and the construction of 6,000 linear feet of 4-inch to 12-inch pipe drains.

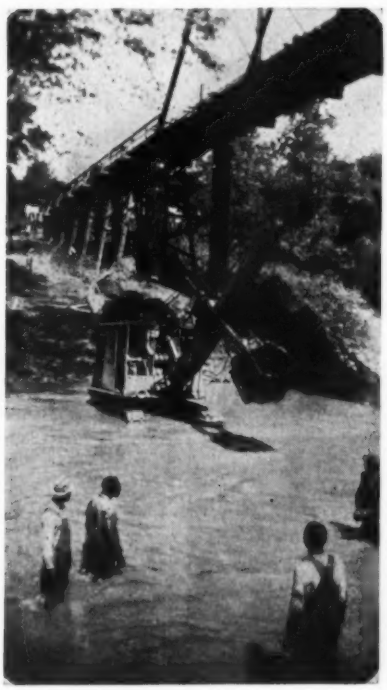
Fording Stevens Creek

M. J. Carroll Contracting Company of Orlando, Florida, recently worked on a 14.5-mile grading and paving project for the South Carolina State Highway Department. The job was a Federal Aid project between Edgefield and Modoc, South Carolina.

Part of the work was building a 25,000-yard approach fill for a bridge across Stevens Creek at a point 25 miles north of Augusta, Georgia. For this, the Carroll Company was using its ¾-yard Bucyrus-Erie shovel. In the course of the work, it became necessary to move this machine across Stevens Creek, 100 feet wide and about four feet deep at this point. The two alternatives were: have the shovel ford the stream under its own power, or send it the "long way 'round"—a task involving a 50-mile railroad haul and walking the machine 16 miles from the nearest siding to the job. Since the former was the quicker, more economical way to get the machine across, that was the course of action decided upon.

High mud banks on each side made it necessary for the shovel to dig its way into the river and then dig its way out again. Timber mats were used under the machine, and a team-drawn cable fall was attached to the rig to keep it from sliding into the river. The crossing was made without unusual incident, and the fill completed. Then the machine reforded the river for shipment to another job.

J. C. McLane was superintendent for M. J. Carroll. Operator Jim Wade handled the 1030 on both crossings.



● In and out again. Having dug its way down the mud bank on one side, M. J. Carroll's ¾-yard shovel fords Stevens Creek and digs its way out on the other side.

What About Road Funds?

Although allocations of 1938 Federal road funds were announced by the Secretary of Agriculture, the various states were requested not to plan actual projects with these funds until Congress makes definite decision regarding the presidentially-proposed cut.

Following President Roosevelt's original recommendation, Representative Cartwright, as House Roads Committee Chairman, wrote the President a letter expressing strong opposition to the cut. The President's reply reiterated the recommendation on the grounds that highway expenditures were above pre-depression levels, and that they kept very few people directly off the relief roles.

Mr. Cartwright's answer may be seen in the following release:

"I have just introduced a bill to provide for continuation of well-established Federal-aid highway policies through the fiscal years 1940 and 1941. The amounts and other definite provisions are, of course, tentative, and intended only to form a basis for consideration by the Roads Committee, which will follow the usual custom and hold extended hearings.

"I am a strong advocate of economy but believe reductions should be made in all agencies of the government and not just make roads the 'goat'.

"I have proposed an authorization of $125,000,000 for primary roads for each of the fiscal years 1940 and 1941, to continue the policy of Federal-aid at the same rate which has been in effect for the past several years. This is about equal to the cost of two battleships.

"Similarly, $50,000,000 for each year is provided for the elimination of hazards at railroad grade crossings, and $25,000,000 a year for secondary or feeder roads, including farm-to-market roads, rural free delivery mail roads and public-school bus routes. Provision is made tentatively, for continuation of development of highways, roads and trails in forests, national parks and parkways and Indian Reservations and public lands on the same basis as authorized in the Hayden-Cartwright Act of 1936 for the fiscal years 1938 and 1939. Other sections substantially repeat provisions of the present law, except that the District of Columbia is permitted to share in Federal-aid and the amount of forest road funds for Alaska is made definite.

"Highway development still lags far behind the steadily increasing demands of traffic. The number of motor vehicles operating on our highways has increased from about 3,500,000 twenty years ago to about 29,000,000 today.

"It is necessary that new authorizations be made by this Congress if an orderly program of highway development is to be maintained and sufficient time allowed for adequate preparation and careful planning of work. State highway budgets must be prepared in advance of the sessions of the State legislatures and the States must have definite knowledge of Federal-aid authorizations in order to make provision for their participation.

"Users of the highways pay special

ROCK-HAULING ... dirt cheap!

GOOD GOING—The "Caterpillar" Diesel makes good time with these La Plant-Choate 19-yard wagons over this road. 38 yards, loose measure, on the way to the dump. That's yardage!

A MAN-SIZED LOAD OF ROCK arrives at the dump on a "half-fare" ticket because of the economical hauling of the "Caterpillar" Diesel Tractor-Athey wagon combination.

▲ A fleet of seven "Caterpillar" D8 Tractors is handling this rock-hauling job near Harrisburg, Penna. The average load for a ½-mile trip is 8 to 12 yards. Each tractor makes four round-trips an hour—consuming only 4 gallons of low-price fuel.

There are several fine points to hauling rock; several things that can *save you money*. And the "Caterpillar" Diesel Tractor has those things down pat!

For instance, take spotting under the shovel. If you can get in close, and get in quick — without a lot of backing and filling — you save time and you save fuel. The "Caterpillar" Diesel Tractor does it with fewer and simpler maneuvers!

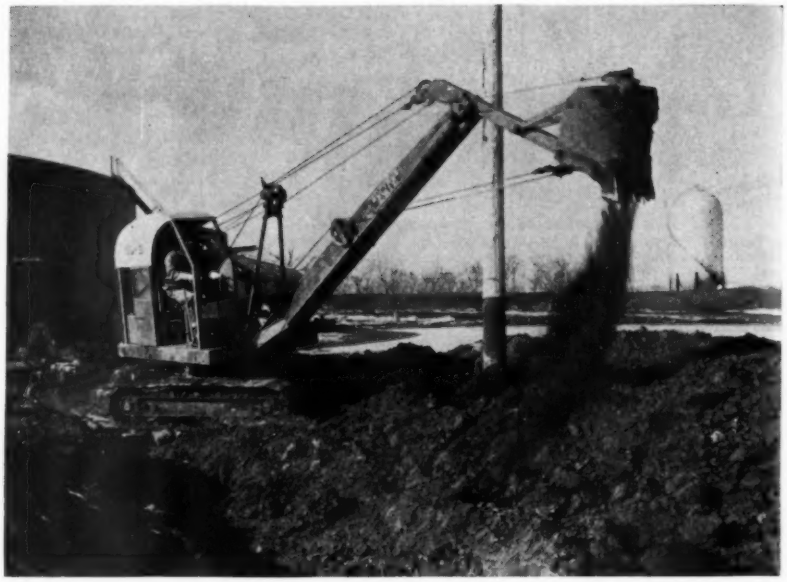
Then, you need power to pull big loads. For the more yardage you take away every hour, the lower the cost-per-yard. You'll see yardage costs come down, when you watch the big loads with which this tractor walks away.

Traction is the next thing. You've got to get out yardage in all kinds of weather. And you *can* — with a "Caterpillar" Diesel Tractor's traction, whether the going is good or bad!

Take those things. Add them to all the other things the "Caterpillar" Diesel Tractor gives: protection from dust and mud . . . minimum up-keep cost . . . low-cost fuel . . . *and you'll haul rocks dirt cheap!*

CATERPILLAR TRACTOR CO.
REG. U.S. PAT. OFF. PEORIA, ILL.

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY



● White Eagle Division of Socony-Vacuum Oil Company at Augusta, Kansas, uses this ⅜-yard Bucyrus-Erie dragshovel for digging a shallow trench in wet gumbo. E. F. Moore is superintendent on this job, with M. Ralston operating the shovel.

taxes, in proportion to their use of the roads, which bring more than $300,000,000 a year into the Federal Treasury. The Federal Government can considerably increase its expenditures for roads and still not draw on its general tax funds, as the motoring public pays the entire bill in special taxes. The Congress has declared that such taxes are unfair and unjust unless used for the improvement of roads. If road expenditures are reduced the special taxes on road users should likewise be reduced. Are we going to let the motorists down?"

Flood Control Recommendations

Budget recommendations for flood control and river and harbor improvements during the fiscal year beginning July 1, 1938, as revealed by printed copies of the Budget as submitted to Congress recently, are as follows:

Flood Control, Lower Mississippi River	$26,000,000
Flood Control, Omnibus Act	50,000,000
Flood Control, Tributaries of the Mississippi River	800,000
Rivers and harbors, new work	30,000,000
Rivers and harbors, maintenance	37,500,000

Although the Budget Bureau recommended only $26,000,000 of the $50,000,000 requested by Army Engineers for Lower Mississippi River flood control work, an analysis of the Budget report shows that the Lower Mississippi actually fared better than any other waterway project in the country.

The break-down of the prospective expenditure of $26,000,000 in the next fiscal year, as revealed in the Budget report, is as follows:

Overhead and contingencies	$ 1,150,000
Revetments	2,300,000
Main line levees	4,900,000
Dredging	6,929,580
Yazoo River	4,600,000
Salaries, Office of the Chief of Engineers	70,420
Eudora Floodway	100,000
Atchafalaya Floodways (Morganza and West Atchafalaya)	100,000
Atchafalaya Basin improvements (Atchafalaya River and Basin outlet west of Berwick, La. and bridges over floodway)	2,050,000
St. Francis River	2,300,000
White River Emergency Reservoir below Helena, Ark.	1,500,000
	$26,000,000

Flood control leaders in the Senate and House believe that these expenditures, added to unobligated funds on hand, will give a good program of work during the calendar year 1938. Moreover, it is expected that the new appropriation will be completed early and the money available by July 1.

The most serious cut of all was given to Rivers and Harbors. For several years new work has amounted to $80,000,000 to $100,000,000 per year. This year the recommended amount is reduced to $30,000,000, of which fully $21,000,000 is to carry on continuing contracts. In singling out rivers and harbors for such a drastic reduction, the President in his message contended that river and harbor improvements and flood control do not create as much employment for labor as other lines of work.

Waterway improvements of all kinds will be grouped again in the War Department non-military bill, which will follow the regular War Department appropriation bill. The President also is insisting on authority to veto items in any appropriation bill without the necessity for vetoing the entire bill. If such authority should be granted, the President could veto any amendment voted by Congress over and above Budget recommendations.

The break-down of the proposed ex-

You can tell by looking at its lower sheave design that a

HI-POWER

is a bucket that will keep the closing line UP out of the muck, save jammed sheaves and move yardage at a profit.

It's a REAL Bucket at a RIGHT Price

Ask for Bulletin 237 on famous HI-POWER CLAMSHELL BUCKETS

WRITE WIRE OR TELEPHONE

HAISS

George Haiss Mfg. Co., Inc., 144th St. & Park Ave., New York

Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

Bucket Loaders — Portable Conveyors

BUCYRUS ERIE

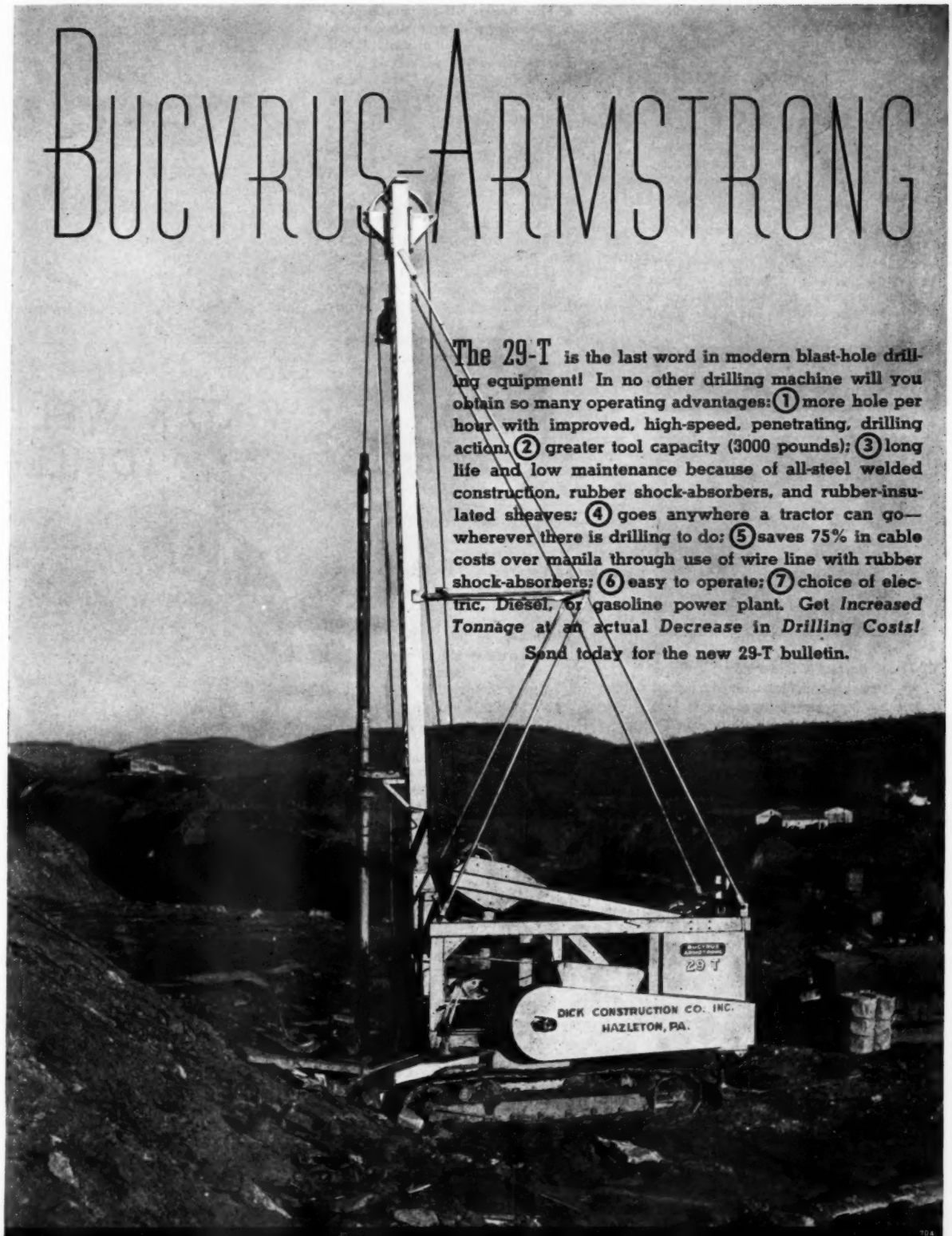
BECO Tiger Teeth are strong and tough . . . properly tapered for easy penetration in hard digging. These alloy-steel teeth can be reversed, resharpened, easily and quickly replaced. State your digging conditions . . . we can furnish teeth to meet your Bucyrus-Erie Excavator requirements. T3

BUCYRUS-ERIE

EXCAVATING, DRILLING & MATERIAL HANDLING EQUIPMENT . . SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to the advertisers on this page, you will find a card bound in this issue.

BUCYRUS-ARMSTRONG



The 29-T is the last word in modern blast-hole drilling equipment! In no other drilling machine will you obtain so many operating advantages: ① more hole per hour with improved, high-speed, penetrating, drilling action; ② greater tool capacity (3000 pounds); ③ long life and low maintenance because of all-steel welded construction, rubber shock-absorbers, and rubber-insulated sheaves; ④ goes anywhere a tractor can go—wherever there is drilling to do; ⑤ saves 75% in cable costs over manila through use of wire line with rubber shock-absorbers; ⑥ easy to operate; ⑦ choice of electric, Diesel, or gasoline power plant. Get *Increased Tonnage* at an actual *Decrease* in *Drilling Costs!*

Send today for the new 29-T bulletin.

BUCYRUS ARMSTRONG

BUCYRUS-ERIE

DRILLING, EXCAVATING, AND MATERIAL-HANDLING EQUIPMENT SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

penditure of $50,000,000 for projects authorized by the Omnibus Flood Control Act is not yet available. Nor is the break-down of $30,000,000 for new river and harbor projects.

60 Years for G-E

Speaking on a national network radio program from Schenectady, Charles E. Wilson, executive vice president of the General Electric Company, pointed out it was on October 15, 1878, that the Edison Electric Lighting Company was incorporated. It was the first of the companies that were eventually merged to form the present General Electric Company, presaging 60 years of achievement which have added so amazingly to the comfort of living and the fullness of life.

"In this period the designing and building of machinery to generate, distribute, and utilize electricity have created a giant industry and multiplied the possibilities of every existing business," Mr. Wilson declared.

"There is a direct line of achievement from Edison's first lamp to the hundreds of millions of lamps shining now in every quarter of the globe; from the first awkward motor to the machines which now drive ocean liners and speed trains across the continent from Edison's fantastic jumbo dynamo to the modern turbine-generator developing hundreds of thousands of horsepower so that we may live and work efficiently. Yet, not a lamp would light nor a wheel turn if it were not for the men who have had vision and courage to make these dreams come true—such men as Edison, Thomson, Brush, Sprague, Van de Poele, Stanley, Coffin, Rice, Steinmetz, Whitney, Coolidge, and Langmuir. In tribute to them and their works, and in confidence that the years to come will stake out even farther horizons, General Electric will celebrate this year its 60th birthday."

Definite plans for the observance of General Electric's anniversary have not yet been announced.

Boulder Dam Revenue

Boulder Dam, which according to the original plans and estimates, was not to have been completed until next year, returned more than $2,000,000 to the United States Treasury by the end of 1937, according to John C. Page, commissioner of Reclamation.

Sale of power by the end of the calendar year amounted to more than $1,110,000, despite the fact that only one-quarter of the generating machinery has been installed and the fact that the Boulder Dam power plant was not in a position to guarantee continuous service and therefore the firm power rate could not be levied until June 1, 1937. In addition to power revenues, $906,000 was collected during the year in payments for generating machinery by the purchasers of power. Title to this equipment remains, however, in the United States.

During 1938 it is estimated that revenues from power at Boulder Dam will increase to $2,500,000.

• This Rogers 40-ton pneumatic-tired trailer with drop deck has a length of 34'3" and a width of 10'. The clear loading deck is 18', the deck height 28", and the height at rear 34". It weighs 22,590 lbs.

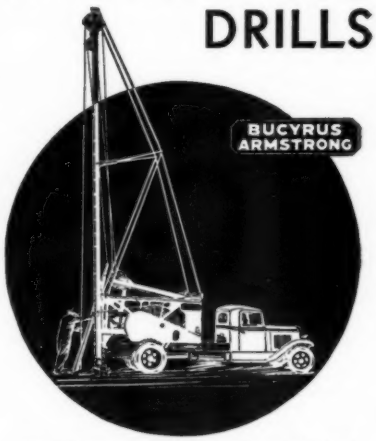
SAUERMAN
LONG RANGE MACHINES

FIRST cost of a Sauerman Slackline or Drag Scraper machine adapted to the average long range job, is less than that of other equipment capable of digging, hauling and placing an equal yardage. Operating and maintenance expense is low, too.

If you have any work in view that requires moving materials any distance from 100 to 1500 ft., you can get some money-saving ideas from the Sauerman catalog.

SAUERMAN BROS.
474 So. Clinton St., Chicago

Modern—
WATER WELL DRILLS



WHEN you need an economical, high-speed water well drill, think of Bucyrus-Armstrong — the most popular, modern, complete line of drills on the market. Four sizes — 21-W, 33-W, 29-W, and 38-W. Made by Bucyrus-Erie, world's largest manufacturer of cable-tool drills for blast-hole, prospecting, and water well drilling.

BUCYRUS-ERIE
DRILLING, EXCAVATING & MATERIAL HANDLING EQUIPMENT SOUTH MILWAUKEE, WISCONSN

HAYWARD BUCKETS
WON'T QUIT OR CAUSE TIME OUT
A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.
THE HAYWARD COMPANY
52-54 Church Street
New York, N. Y.

CONTRACTORS—

List your surplus equipment for sale in Excavating Engineer. A $2.40 advertisement may put hundreds of dollars in your pocket. We have had

BUYERS FOR

the equipment listed below among the inquiries received the past 30 days.

Used—3-yard dragline
Used—steam crane
Used—2 40-ton trailers
Used—⅜-yard shovel
Used—60-ton trailer
Used—1¼-yard shovel
Used—air compressor

Turn to page 130 for rate information

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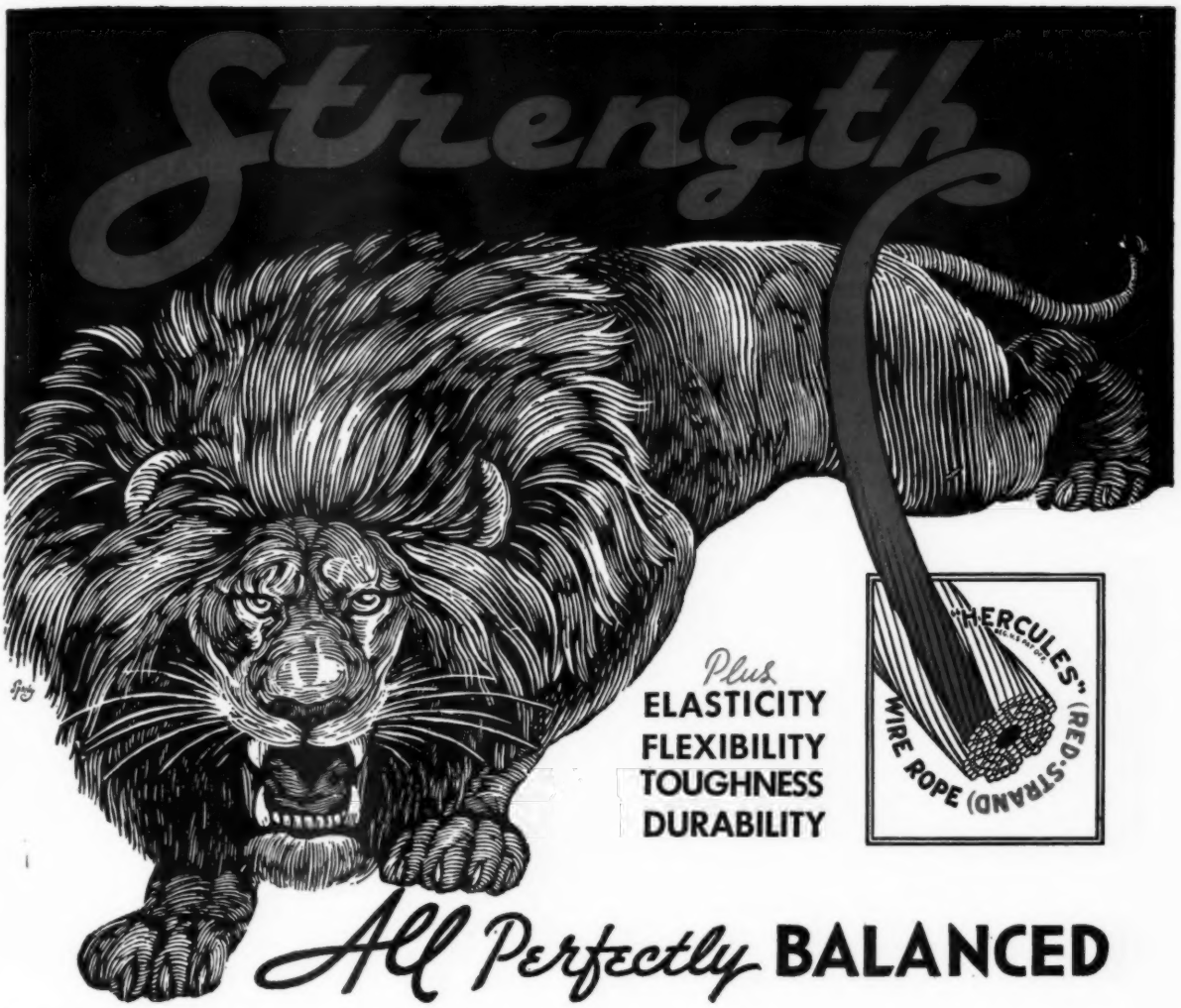


All Perfectly BALANCED

Strength alone does not make the Lion "King of the Beasts."

For Maximum Efficiency in Preformed Wire Rope, Use . . .

PREFORMED
"HERCULES"
RED-STRAND
WIRE ROPE

Available in Both Round Strand and Flattened Strand Constructions

*Reg. U.S. Pat. Off.

"Hercules" (Red Strand) Wire Rope offers more than the strength necessary for the most gruelling work, because we have learned from experience that more than strength is necessary.

We protect the strength built into "Hercules" (Red Strand) with these other essentials — toughness . . . flexibility . . . durability . . . and elasticity — all kept in perfect balance. A method we have evolved during our eighty years of manufacturing experience.

In "Hercules" (Red Strand) you *always* get ALL FIVE properly balanced for maximum performance. The wire rope of real economy.

Made Only by **A. LESCHEN & SONS ROPE CO.** *Established 1857*

5909 Kennerly Avenue, St. Louis, Missouri

New York	87 to 90 West St.	Portland	914 N. W. 14th Ave.
Chicago	810 W. Washington Blvd.	San Francisco	520 4th St.
Denver	1554 Wazee St.	Seattle	2244 First Ave., South

For your convenience in writing to A. Leschen & Sons Rope Co., you will find a card bound in this issue.

BEAR WITH US

(Continued from page 107)

teen red lanterns which he flattened with the steam-roller in which he was riding at the time of his arrest.

Bulletin from the Wall Street Howl, Saturday, February 5th:

Shovels, Inc., opened at 17 and advanced steadily throughout a morning of brisk trading, standing at 18¼ at noon. Rumor mentions a large contract from a Balkan country as the cause of the steady rise of this stock, which stood at 12¼ a week ago.

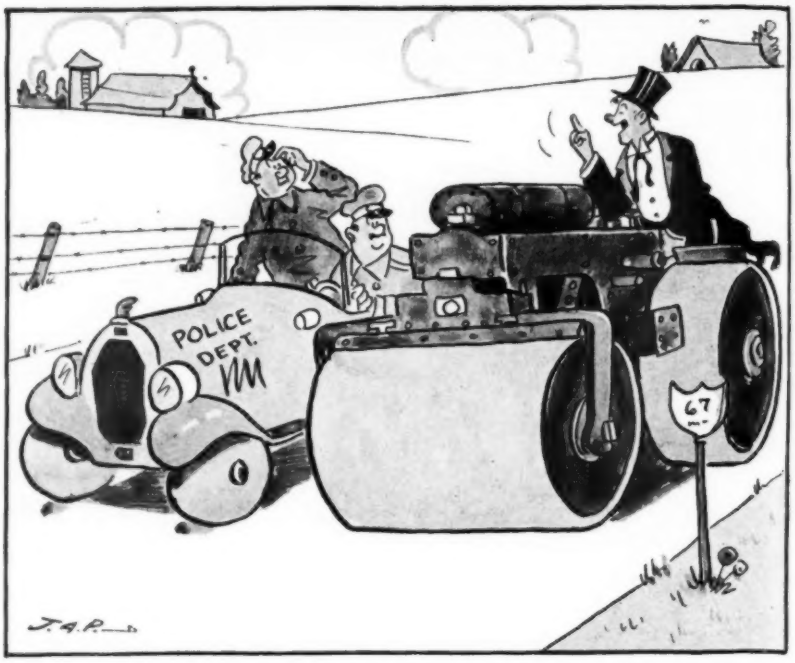
Telegram from K. Klospeggi, Secretary to Consul, Abalonian Consulate, New York, N. Y., to D. Itch, President, the D. Itch Digger Company, Circle Center, Ohio:

REGRET TO INFORM YOU IN ACCORDANCE WITH YOUR REQUEST MADE SEVERAL WEEKS AGO WHEN YOU ENTERED BID THAT YOUR BID IS NOT LOWEST AMONG BIDS OPENED TEN MINUTES AGO AT NOON TODAY STOP NO REVISED BIDS WILL BE CONSIDERED

K KLOSPEGGI SECY TO CONSUL GENL

"Long distance call from New York for you, Mr. Itch. A Mr. Williams is calling. Shall I put him on?"

Mr. Itch bit through the end of his cigar and spat out the tobacco. "Yes!" he barked.



● " . . . and flattened 17 red lanterns."

"Hello, Mr. Itch? This is Williams. How are you, Mr. Itch?"

"How am I?? Why, you—, you—"

"Now, now, Mr. Itch. Don't get excited. I did my best and it wasn't my fault that I got put in jail because if I hadn't got Mr. Rogers drunk we'd have never found out about how Mr. Inchweiler double-crossed you and gave away your bid to the Shovels, Inc. people and you'd have lost the contract anyway."

"Mr. Inchweiler? Do you mean to say that he was the one who gave us away? Why, that double-crossing skunk! But what makes you think it was him?"

"I thought of it while I was being sent to jail this morning from the court at Round Corners, Mr. Itch. While I was talking to him, he was called out of the office once, and just out of curiosity, I looked among the papers on his desk and there was an order to *buy* 10,000 shares of Shovels, Inc. I remembered that this morning and it fitted in: why should he buy Shovels, Inc. for himself unless he knew they and not you were going to get that contract? And he knew the amount of your bid!"

"Why that double-crossing rat! Listen, William, it's almost worth losing the contract just to find out about . . . "

"But you didn't lose the contract, Mr. Itch. You'll be getting a telegram pretty soon from Zahn himself, saying that it was awarded to you after the two lowest bidders were disqualified."

"Huh? The *two* lowest bidders.

● "Shovels, Inc., advanced steadily."

BUCYRUS-MONIGHAN

STABILITY - anywhere!

EVERY move the Bucyrus-Monighan walking dragline makes is a time saver. Every step leads to stability on any ground that will support a man. On the world's biggest excavation projects, on strip mining operations, through every season of the year, the Walker is always "on top of the bank, and on top of the job!" . . . Manufactured by Bucyrus-Monighan Company, Chicago, Illinois.

● Resting solidly on its huge circular base — ready to step away from trouble or maneuver to a new working position in a moment — this 10-W dragline swings into a big output pace in stripping overburden for Maumee Collieries, Terre Haute, Indiana.

BUCYRUS MONIGHAN

Sold by BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WISCONSIN, U.S.A.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

● "They can't make a playground of Rutabaga County."

Listen, William, do you have a hangover? Do you feel all right?"

"Well, I do have a slight one, Mr. Itch, and that's probably why it took me so long to get things straightened out after my lawyer friend, Mr. Kingsley, called and got me out of jail at 9 o'clock this morning. We were ninety miles from town, even then, and it took some fast work to get everything straightened out in time."

"But you said *two* lower bidders, William. What on . . . "

"You see, Mr. Itch, I had to stall the consulate first from awarding the contract to the Shovels people while I fixed things. So I had my lawyer friend, when we got in New York at 10:30, send in a bid a little lower than the Shovels, Inc., bid in the name of the Whoopla Excavating Co., while I went to see Mr. Inchweiler, who double-crossed you."

"The Whoopla Excavating Co.? I never heard of it!"

"There isn't any such company, Mr. Itch. But it's bid was lowest and that would hold off the awarding of the contract to Shovels, Inc. for a few hours while I got into action. And it did.

"You see, Mr. Itch, while my friend was doing that I went to Mr. Inchweiler and told him that I had a signed statement from Mr. Rogers of the Shovels, Inc. crowd that he had given them the figures of the D. Itch Digger bid. And he turned white around the gills when I showed it to him."

"But this is news to me, William. When did you get that confession? That was wonderful work."

"Well, I wrote it myself on the way, Mr. Itch. I figured he wouldn't know Rogers' handwriting, and he wouldn't know how I knew unless Rogers *had* confessed. Then, while he was groggy, I told him that we wouldn't start any trouble if he would give me a similar signed confession."

"And he did? I thought he was a tougher nut to crack than that?"

"Well, he demurred at first, Mr. Itch. Then I reminded him that it was a chance to make a pile of jack. All he had to do was to get rid of his Shovels, Inc. stock before the market closed, at a nice profit, and to sell short on as much of it as he could get rid of. Why, he could make a fortune, and I showed him how."

"Why, that triple-crossing son of . . . "

"That's what I figured, Mr. Itch. He thought I had him anyway with a confession from Rogers, so he triple-crossed.

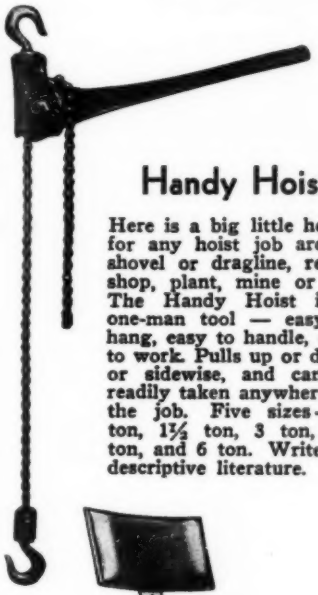
"It was 12:15 when I got to the consulate, and at first the consul told me it was all over and that the bid had been awarded to the Whoopla Excavating Co., but I finally got him to listen and I spilled the whole story. And gave him Mr. Inchweiler's signed confession and pointed out the five-dollar difference in the bids as corroborating evidence.

"He agreed at once to outlaw the Shovels, Inc. bid on the signed evidence, and said he had full authority to award the bid to whom he liked and that he would never award it to a crooked company for a five-dollar difference. He said he accepted my story that the Whoopla bid was fictitious, but that as a formality he'd make a brief effort to locate them, and if he didn't find them, you were next lowest bidder, and the contract would be in your hands by tonight."

"William, you're a wonder. What can I do to repay . . . "

"Never mind, Mr. Itch. I'll get mine. You see, I was already 2,000 shares short on Shovels, Inc. and I sold 2,000 more just before the market closed, and it's going to hit bottom Monday when the news is out about their losing the Balkan contract. Just call on me any time you need help, Mr. Itch."

A Money Saving Accessories



Handy Hoist

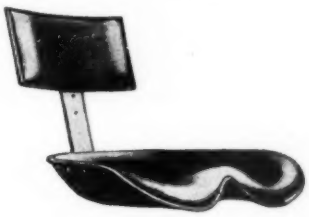
Here is a big little helper for any hoist job around shovel or dragline, repair shop, plant, mine or pit. The Handy Hoist is a one-man tool — easy to hang, easy to handle, easy to work. Pulls up or down or sidewise, and can be readily taken anywhere on the job. Five sizes—¾ ton, 1½ ton, 3 ton, 4½ ton, and 6 ton. Write for descriptive literature.

Push-Pull Jack

No matter how unusual your "push, pull, clamp, or straightening" problem may be, BECO Jack is the tool that gives you a safe, sure, and proved means of doing the job better. The drop-forged nuts, lever socket, ratchet and screw are heat-treated so that a welding heat will not damage the jack. Screw lengths — 10", 12", 14", 16", and 18". Capacity 35,000 lbs. Send for bulletin.

Wire Rope

Selected by the men who build your excavating and drilling machinery, Bucyrus-Erie rope has the special features that spell better performance. B-E wire rope has a uniform high quality, and comes in the right sizes, types, and construction for your exact needs. Send for wire rope bulletin.



Comfortable Seats

Avoid operator-fatigue and increase output — modernize your machines with BECO Seats. These seats are comfortable, provide insulation from vibration, are adjustable to the individual, and may be shifted from one machine to another. Descriptive bulletin sent upon request.

Thrust Collars

These easily installed BECO Thrust Collars will keep gears and pinions in mesh, take up end-play, and cut wear and tear from loose bearings. When ordering give inside and outside diameters and thickness of collar required.

Power Cable

Bucyrus-Erie Power Cable is —compact . . . flexible . . . long-lived . . . vulcanized to produce a non-porous rubber jacket, absolutely waterproof and highly resistant to oils and acids. Write for prices.

Rope Sockets

Bulldog wedge rope sockets never fail. The harder the pull . . . the tighter the grip! Attachment is easy and quick and directly in line with pull, eliminating costly kinks. Made in a dozen sizes and four different styles. Write for bulletin.

Links and Rings

BECO Links and Rings save you time and money. The Links permit quick repairs to broken chain; the Rings revolve, spreading wear evenly. Order today.

220

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

NOT in the *Contract*

"What is home without a mother?" the young operator asked with a sigh.

"I am, tonight," replied the little blue-eyed blond.

Mabel: "Isn't that a new suit your husband's wearing?"

Maud: "No."

Mabel: "Well, he looks different, somehow."

Maud: "Yes, he's my new husband."

"I have no sympathy for a man who gets drunk every night."

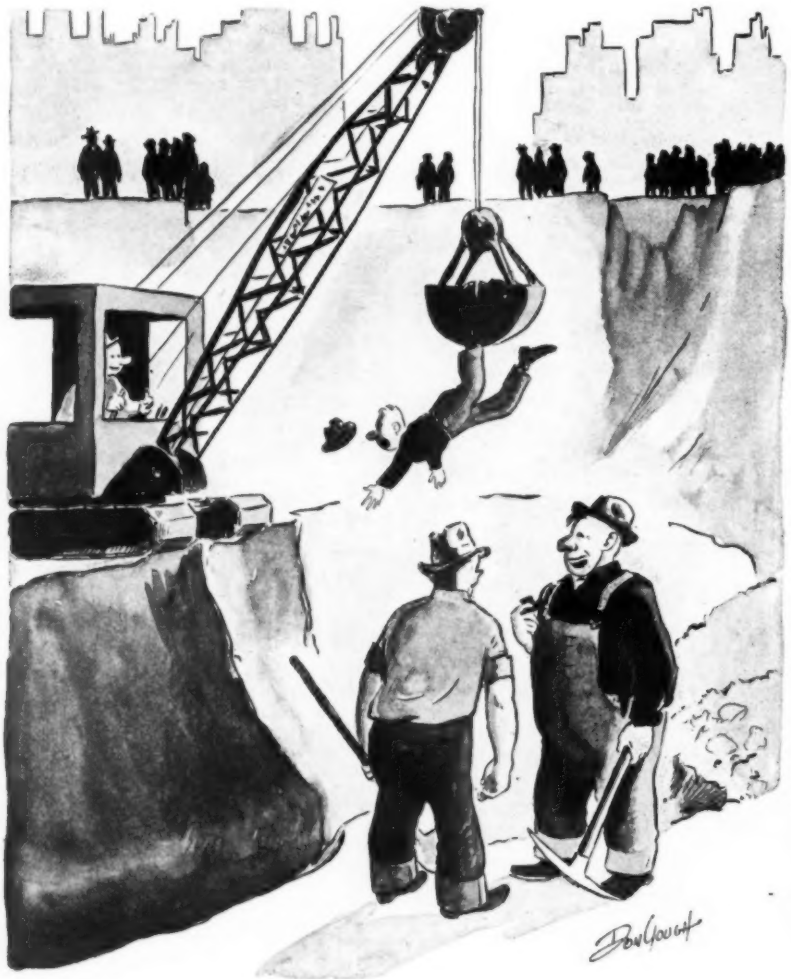
"Lady, a guy that's that lucky needs no sympathy."

Professor: "What on earth made you write a paragraph like that?"

Student: "I copied it from Dickens."

Professor: "Beautiful l i n e s, aren't they?"

The man with the suitcase chased the train to the end of the platform, but failed to catch it. As he walked slowly back, mopping his brow, an interested onlooker remarked: "Miss the train?" "Oh, not much," was the reply. "You see, I never got to know it very well."



"CASEY'S A RIOT - ALWAYS PLAYIN TO THE GRANDSTAND."

Teacher: "Who gave us this beautiful school?"

Pupil: "President Roosevelt."

Teacher: "Who keeps our roads so nice?"

Pupil: "President Roosevelt."

Teacher: "Who makes the trees and flowers grow?"

Pupil: "God."

Voice from the Rear: "Throw that Republican out."

Miss Pert: "Who's playing at the neighborhood movie tonight?"

Operator: "Me and you, baby!"

First Doctor: "I haven't seen Smith since we left medical school. Whom did he marry?"

Second Doctor: "A stomach specialist of sorts."

First Doctor: "You mean an eminent lady surgeon?"

Second Doctor: "No—an eminent Egyptian muscle-dancer."

A homely girl approached the information desk at the tourist park, and asked for a road map.

"Here you are," said the clerk.

"Well, I hope I won't go wrong," replied the girl.

"With that map," retorted the clerk, "you can't possibly."

Sammy: "I can see good in all things."

Oscar: "Can you see good in a fog?"

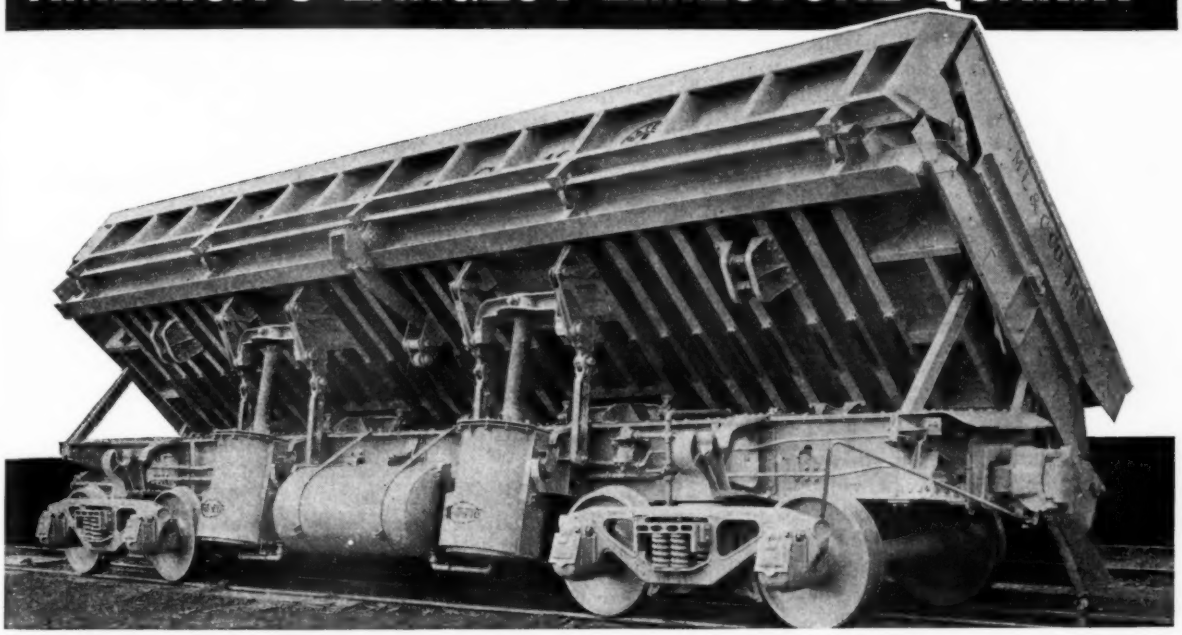
One of our readers has sent us a clipping which, so he claims, contains information of great value to men. If you are bored by your feminine dinner companions, ask these three questions:

1. Ask the lady on your right if she's married. Should she say "Yes," ask her if she has any children. If she says "No," ask her how she does it.

2. Ask the lady on your left if she's married. If she says "No," ask her if she has any children.

3. Ask the lady across from you if she has any children. If she says "Yes" ask her if she's married.

15 "Western" 36-yard Cars for
AMERICA'S LARGEST LIMESTONE QUARRY



THE MICHIGAN LIMESTONE AND CHEMICAL COMPANY EFFECT NEW OPERATING ECONOMIES THROUGH SAVINGS IN WEIGHT — IMPROVED DESIGN

EXTRA STRENGTH... due to weight saving tough alloy steels... give these new 36-yard water level cars the highest ratio of pay load to dead weight. With unlimited clearance due to drop door construction the largest pieces or chunks are easily dumped to either side, the doors acting as aprons to deposit the materials well away from the track.

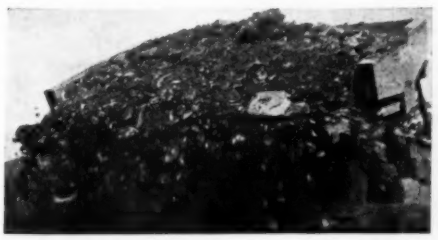
"Western" side dump cars use less air than all other makes because their superior design requires less lifting effort. The simplicity of the large diameter single stroke cylinders assure long life at practically no maintenance expense.

The 50° dumping angle, the seamless floor and smooth discharge surfaces assure fast, complete dumping of any type mine or quarry material. They comply with the latest American Association of Railroads, and Interstate Commerce Commission recommended car practices, and are acceptable for interchange revenue service under load.

Austin-Western are leaders in the development of on and off track haulage equipment. More than 60 years of successful experience in designing and building this type of machinery have qualified us to supply your requirements exactly. Ask us to figure your haulage requirements.

THE AUSTIN-WESTERN ROAD MACHINERY CO.
1821 Barrows Street, Aurora, Ill. Cable Address AWCO, Aurora, U.S.A.

These new cars have a welded bed underframe with a continuous steel floor plate welded to the bed underframe.



Rubber tired semi-trailers for motor truck haulage. A-W light weight heavy duty pneumatic tired trail cars have proved their economy in open pit mines throughout the country—used with truck tractors and track type crawler tractors, end, bottom, or two-way side dump.

Austin-Western

For your convenience in writing to the Austin-Western Road Machinery Co., you will find a card bound in this issue.

Gasoline Tractor Lubrication

(Continued from page 99)

uct, cut back a heavy oil with kerosene. While the purpose of ultimately securing a light bodied gear oil is accomplished, we must realize a great degree of gear tooth protection is lost by this practice. Kerosene is not a lubricant. Dilution of the gear oil with kerosene is a dangerous practice, not only because of the reduced protection but also because the stability of our resultant gear oil is impaired. Hence, we strongly advise the use of a proper gear oil for the existing operating temperature and the avoidance of a make-shift undependable product.

The balance of the lubricants can be grouped under one heading, namely that of greases. Practically without exception, universal joints, chassis fittings, wheel bearings, water pumps, etc., are grease lubricated. While we will discuss each as a separate problem, the general "whats" and "whys" of greases can be briefly grouped for our purpose.

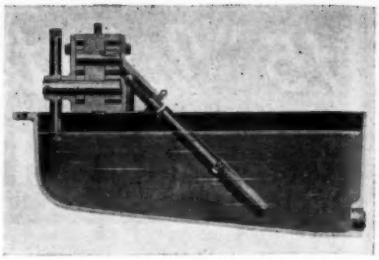
The manufacturer of greases assumes about the same technique as making a cake. Several ingredients are mixed, beaten and cooked to form the final product. Different cooks have different formulae, perhaps different materials and undoubtedly different "baking" tricks. In the main, however, a grease is a more-or-less liquid soap, into which is beaten or stirred a lubricating oil. The soap can be made of various bases such as sodiums, calciums, aluminates, etc., each lending its own peculiar characteristics to the final product. The soap is made to the consistency desired, the lubricating oil beaten into the soap and we have a grease.

The consistency of the grease, or in other words its "thickness", is governed by both the type and quantity of soap in the grease. The standard term of defining grease consistency is given by "penetration numbers". This simple method is merely the dropping of a cone-shaped weight, point down, into a given grease. The depth the cone enters the grease is read off in standard units. The softer the grease—the greater depth the cone will penetrate the grease. Thus, the larger the penetration number, the softer the grease and conversely. The penetration number should not be confused by the "single numbering" groupings of viz: No. 1, No. 2, etc., greases. No. 1 greases are the softer greases, whereas No. 6 greases are heavy. While no definite classification exists, these single number grease consistencies have more-or-less ranges in the penetration numbers.

The type and body of the oil used in making the grease is determined by experience and laboratory research. One No. 2 grease may be made with a relatively heavy bodied oil whereas another No. 2 grease may be made with a light bodied oil. This question of oil content and oil body is one determined only by the manufacturer and is a matter of his own good judgment.

In wheel bearings, particularly of the automotive type, we usually desire a grease that will resist the temperatures developed by brake drum friction. In tractors this temperature consideration is slight, but the same type anti-friction bearing is used as in the automobile. The best field experience indicates the use of soda soaps for anti-friction bearings of approximately a No. 5 consistency, utilizing a relatively heavy bodied oil. For universal joints and general chassis fittings, a No. 2 grease with a light bodied oil content is desired. Adhesiveness is a characteristic demanded and usually a trait of aluminum base greases.

The question of water pumps demands still another type



● Here are oil sump and lubricating oil pump of the Allis-Chalmers model "K" tractor.

grease. Here the grease must resist the effects of moisture—resisting the washing effect of water—a medium bodied oil content is desired, while the grease consistency itself should be approximately No. 6.

From the foregoing one can easily realize the number of "don'ts" which could be written about greases. Authorities themselves will disagree on many major points and while we certainly do not set ourselves up as an authority, we will risk the following general guide for the selection of the several greases needed for our tractor. This chart is, of course, a single opinion, and whether followed or not, we definitely suggest attention be paid to grease selection and the matter not left to haphazard purchasing.

In conclusion, we would make or set up one "don't" in capital letters, mainly, "Don't ask the lubricant, whether engine oil, gear oil or grease to make up for worn parts". The manufacturer has made the parts of his tractor heavy enough and of such materials that with proper care and proper lubricants a reasonable return will be secured on the investment made. However, if wear does take place and while the selection of lubricants will help to offset the evils of wear—it must be realized even lubricants have their limits.

	Application			
Approximate Specification Penetration	Universal Joints and Chassis Fittings Too soft to measure	Wheel Bearings 240 to 290	Water Pumps 200 to 250
Soap			
Base	Aluminum	Soda	Lime
Percent Content	7% to 10%	15% to 20%	20% to 25%
Oil			
Viscosity @100°F	120" to 130"	1650" to 1750"	825" to 875"
Percent Content	90% to 93%	80% to 85%	75% to 80%

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Trade notes

The Bucyrus-Erie Company, South Milwaukee, Wisconsin wishes to announce that its San Francisco offices formerly located at 989 Folsom St. have been changed to 390 Bayshore Blvd. Phone Atwater 2341.

The Brooks-Payne-Osborne Equipment Company distributors for the Bucyrus-Erie Company, South Milwaukee, Wisconsin, and the Day Pulverizer Company both of Knoxville, Tennessee have now consolidated to form **The Brooks Equipment and Manufacturing Company.** This firm has its offices, factory, and warehouses at 408-410 Davenport Road, Knoxville, Tenn.

Bucyrus-Erie Company, South Milwaukee, Wisconsin, has recently appointed W. L. Hartley, 7031 W. Wisconsin Ave., Milwaukee, Wisconsin as their representative for the state of Wisconsin and Upper Michigan.

Frank J. Schermer, sales representative in the drill division of Bucyrus-Erie Company, died at Evansville, Indiana, on Saturday, January 15th.

Born and raised in Dyersville, Mr. Schermer in 1910 began the selling of Armstrong drills for the Armstrong Manufacturing Company of Waterloo, Iowa. When Bucyrus-Erie Company took over this business in 1933, Mr. Schermer became a part of the new drill sales organization. In his travels throughout the United States and Canada, Mr. Schermer made the acquaintance of hundreds of users of drilling equipment and his loss will be felt by his many friends in the industry.

Book reviews

The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation, announces the publication of a folder, entitled "Steel Hard-Facing Procedure." This pamphlet has been reprinted from the April, 1937, issue of OXY-ACETYLENE TIPS, and presents detailed instructions for applying the hard-facing material, Haynes Tellite, to steel wearing surfaces.

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BROWNING—½-YARD GASOLINE SHOVEL and clamshell. Clamshell boom 30' plus 10' extension. Clamshell bucket included. Good condition. Located Maine. Box 1116-SS.

BUCYRUS-ERIE — TYPE A, ½-yard steam shovel. Cat mounted. 26' boom clamshell equipment. Located Central Illinois. Box 2007-SS.

BUCYRUS-ERIE 16-B GAS SHOVEL. 16'6" boom—12'6" dipper handle—½ cubic yard cast front inserted tooth dipper. Waukesha 6 cylinder 3¾"x4¾" gasoline engine. Excellent condition. Will demonstrate. Located western New York State. Box 930-SS.

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MEAD-MORRISON. ½-yard shovel and dragline. Electric starter and lights. ½-yard Page drag bucket. Buda 4½"x6" gas engine. Generally fair operating condition. Located Minnesota. Box 2057-SS.

P & H—MODEL 300—½-yard gasoline shovel. Reconditioned. Located Kentucky. Box 1107-SS.

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BUCYRUS-ERIE Type A steam shovel. 16' boom. 12'-6" dipper handle. ⅝ yard shallow cut dipper. Two speed propelling mechanism. Hand operated boom hoist. Located vicinity New York. Box 958-SS.

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¾-YARD

BUCYRUS-ERIE — TYPE B, ¾-yard steam shovel and 40' boom clamshell. Cat. mounted. Located Buffalo, New York. Box 2005-SS.

BUCYRUS-ERIE TYPE B steam shovel. High lift. Boiler reported good condition and machinery generally in fair condition. Located Rockford, Illinois. Box 963-SS.

BUCYRUS-ERIE TYPE B STEAM combination Shovel-clamshell and steam hoe. Machine completely rebuilt 1929. Good operating condition. Located near Boston. Box 517-SS.

BUCYRUS-ERIE (2) TYPE "B" HIGH LIFT Caterpillar mounted Steam Shovels. Good operating condition. Located Eastern Pennsylvania. Box 1014-SS.

BUCYRUS-ERIE TYPE B Steam shovel, caterpillar mounted. Located Indiana. Box 983-SS.

BUCYRUS-ERIE 1030 gasoline shovel and clamshell. 23' shovel boom. 15' dipper handle ¾ yard dipper. 35' clamshell boom and Owen "M" Model 230 clamshell bucket. Wisconsin B-3 gasoline engine. Cylinder blocks recently rebored. Machine in fair condition. Located Massachusetts. Box 982-SS.

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BUCYRUS-ERIE TYPE B high lift steam shovel. Excellent operating condition. Located Seattle, Washington. Box 943-SS.

BUCYRUS-ERIE TYPE B High Lift steam shovel. Single shaft cats. Good condition. Bargain price. Located Rhode Island. Box 2046-SS.

BUCYRUS-ERIE—TYPE B ¾ YD. Caterpillar mounted Extra high-lift steam shovel. Located Chicago. Good working order. Will rent or sell. Box 1100-SS.

BUCYRUS-ERIE TYPE B steam ¾-yard shovel and 36' boom clamshell including ¾-yard Williams clamshell bucket. Located Central New York. Box 1188-SS.

NORTHWEST—MODEL 105, ¾ yard gasoline shovel. Climax 4 cylinder 5½"x7" gasoline engine. Good operating condition. Located Eastern Pa. Box 1015-SS.

NORTHWEST MODEL 105 Combination shovel and clamshell. 24' shovel boom. 17½' dipper handle. ¾-yard dipper. 40' clamshell boom. Type "C" Lakewood 1-yard clamshell bucket. Twin City gasoline engine. Reasonably good condition. Located near Chicago. Box 2045-SS.

OSGOOD — GASOLINE — COMBINATION shovel, clamshell, and dragline equipped with electric starter. Shovel Boom 19'6"—Dipper Handle 14'—Dipper 1 yard standard and 1½ Beet Loading Type. 40' Clamshell and Dragline Boom. Hercules 6 cylinder 85 H.P. engine. Fair condition — good appearance. Located Colorado. Box 1018-SS.

OSGOOD. COMMANDER. Combination shovel, dragline and clamshell. ⅜-yard Rock Type dipper. 35' dragline and clamshell boom. ¾-yard Page drag bucket. Hercules 6-cylinder 4⅛"x4½" engine. Completely rebuilt recently and new engine installed. Bucket very good. Will sell on terms. Located Texas. Box 2038-SS.

⅞-YARD

BUCYRUS-ERIE B-2. Extra High Lift shovel. 21'3" boom. 18'4" dipper handle. ⅞-yard dipper. Single shaft cats. Well cared for. Good condition. Located Rhode Island. Box 2047-SS.

FOR SALE

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BUCYRUS-ERIE B-2. Extra High Lift steam shovel. 21'3" boom. 18'4" dipper handle. ⅞-yard dipper. Single shaft cats. Fair working condition. Located Chicago. Box 2039-SS.

BUCYRUS-ERIE—1035 GASOLINE SHOVEL. Chain Crowd. ⅞-yard Dipper. 26-in. caterpillar treads. Electric starter. Needs some repairs. Located vicinity Boston. Box 1065-SS.

BUCYRUS-ERIE—B-2—HIGH LIFT Caterpillar Mounted Steam Shovel. Good Operating condition. Located Eastern Pennsylvania. Box 1019-SS.

BUCYRUS-ERIE TYPE B-2, ⅞-YARD high lift steam shovel. Located Boston. Box 1089-SS.

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BUCYRUS-ERIE—B-2—HIGH LIFT STEAM shovel. 21'3" boom, 16' dipper handle, ⅞-yard dipper. Single shaft caterpillar. Located Vermont. Box 1135-SS.

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MARION MODEL 21 — ⅞ CUBIC YARD steam shovel. Caterpillar mounted. Good working condition. Located Georgia. Box 758-SS.

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AMERICAN. Combination 1-yard shovel and dragline. 20' boom. 16' dipper handle. 1-yard dipper. 40' dragline boom. 1-yard Omaha drag bucket. Waukesha 6"x7" 95 H.P. 4-cylinder engine. Generally fair condition. Located Minneapolis. Box 2044-SS.

BUCYRUS-ERIE GA-2 GAS-AIR SHOVEL 22'6" boom—16' dipper handle—one yard dipper. Waukesha four cylinder 5¾"x8" engine. Overhauled approximately one year ago. Fair condition. Located Knoxville, Tennessee. Box 870-SS.

BUCYRUS-ERIE—GA-2 Gas-Air High Lift 1 yard shovel. Air starter. Single Shaft Cat. Fair condition. Located Western New York. Box 996-SS.

BUCYRUS-ERIE GA-2 COMBINATION shovel and clamshell. 24' boom. 18'4" dipper handle—1 cu. yd. cast front inserted tooth dipper. 45' boom. Complete clamshell equipment including 1 yard Williams Fav. Clamshell bucket. Air starter. Single shaft cat. Waukesha 4 cylinder 5¾"x8" gas engine. Fair operating condition. Located Eastern Pennsylvania. Box 932-SS.

BUCYRUS-ERIE GA-2 — Gas-air — high lift shovel. Good operating condition. Located Eastern Pennsylvania. Box 945-SS.

BUCYRUS-ERIE 1030 — ELECTRIC TUNNEL shovel. Boom 10 ft. 7 in. Dipper handle 10 ft. 5 in. 1-yd. dipper. Boom hoist 5 ft. 6 in. rear end clearance. 2 motor—power supply 3 phase, 60 cycle, 440 volt. Located Virginia. Box 1068-SS

BUCYRUS-ERIE—D-2 1 yard Diesel Shovel. Atlas engine. Said to be in very good condition. Located South Carolina. Box 1079-SS

BUCYRUS-ERIE GA-2 SHOVEL AND CRANE. 22 ft. 6 in. shovel boom, 16-ft. dipper handle, 1 cu. yd. cast front inserted tooth dipper, 50-ft. box type crane boom. Air starter. Good condition. Located Newark. Box 718-SS.

BUCYRUS-ERIE 31-B — 1 YARD STEAM shovel. Located Lawrence, Mass. Make an offer. Box 1092-SS.

BUCYRUS-ERIE—B-2 AIR, tunnel shovel. Boom 14'6". Dipper handle 10'9". Dipper ⅞-yard capacity. Located vicinity New York. Box 869-SS.

BUCYRUS-ERIE—GA-2 GAS AIR. Extra high-lift shovel. 24' boom, 18'4" dipper handle—1 yd. dipper. Single Shaft Caterpillar. Waukesha 4 cylinder 6¼" by 8" engine. Good working order. Will rent or sell. Located Central Illinois. Box 1103-SS.

BUCYRUS-ERIE 31-B — 1 YARD STEAM SHOVEL. Located Tennessee. Box 1093-SS.

BUCYRUS-ERIE — GA-2 — GAS-AIR — extra high lift shovel. 24' boom, 16' dipper handle, 1-yard dipper. Air starter. Mass. air tanks. Single shaft caterpillar. Located Massachusetts. Box 1121-SS.

BUCYRUS-ERIE—31-B STEAM SHOVEL. 22' boom, 15' dipper handle, 1-yard dipper. Now operating, can be demonstrated. Located Alabama. Box 1130-SS.

BUCYRUS-ERIE—Type B-2 Steam Shovel. Reasonably good condition. Located near Boston. Box 1156-SS

BUCYRUS-ERIE—30-B Electric Shovel. Suitable for power supply. 3 Phase, 60 Cycle, 440 Volt. Machine equipped with 3 motors. Said to be in first class operating condition. Located New Jersey. Box 1162-SS

LORAIN—MODEL 60—1-YARD shovel. Located Southern Virginia. Box 1182-SS

MARION MODEL 7, 1-yard steam shovel. Has not operated in the past five years. New flues recently installed in boiler. Located Buffalo, New York. Box 2006-SS.

MOORE—SPEED CRANE. 1-yd. shovel and 50' boom dragline and crane. Gasoline. Located St. Paul, Minn. Box 2012-SS.

NORTHWEST—MODEL 105—GASOLINE shovel—1-yard. Located Massachusetts. Box 1123-SS.

OSGOOD — COMBINATION 1-yd. shovel—45' boom dragline. Le Roi 6-cyl. engine. Fair condition. Located Central Illinois. Box 1173-SS.

P&H MODEL 600. 1-yard gas shovel. 23' boom. 16'9" dipper handle. 1-yard dipper. Waukesha 4-cylinder 6"x7" engine. New type internal clutches, fuel pump instead of vacuum pump. Good condition except few minor repairs needed. Located Chicago. Box 2040-SS.

P. & H. MODEL 600—1-YARD GAS SHOVEL and 40' boom clamshell. Waukesha JL-6"x7" Engine. Located North Carolina. Box 1095-SS.

P & H—MODEL 600, 1 YD. SHOVEL and dragline. Shovel boom 19'6". Dragline boom 40'. Drag bucket included. Waukesha engine. Good condition. Located Central Illinois. Box 1102-SS.

1¼-YARD

BUCYRUS-ERIE. GA-2, Gas-Air. 1¼-yard shovel. Electric starter. Waukesha W.L. 4-cylinder 6¼"x8" engine. Single shaft cat. Extensively repaired recently. Located Texas. Box 2030-SS.

BUCYRUS-ERIE GAS-AIR GA-2 shovel and dragline. 24' shovel boom. 16' dipper handle. 1¼-yard dipper. 40' dragline boom. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Factory rebuilt 1935. Excellent condition. Located Indianapolis. Box 2041-SS.

BUCYRUS-ERIE E-2 shovel and dragline. 1½-yard Plate dipper. 45' boom plus 10' extension. 1¼-yard Page drag bucket. Electric light plant. Atlas Diesel engine. Engine overhauled since last used. Balance of machine good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SS.

BUCYRUS-ERIE—GA-2 Gas-Air High Lift Shovel. 24-ft. boom, 16-ft. dipper handle, 1¼-yard dipper. Located Virginia. Box 1063-SS.

BUCYRUS-ERIE—GA-2 Gas-Air 1¼ yd. shovel. 45' boom clamshell machine. Single Shaft Cat. Recently overhauled by owner. Located New York. Box 997-SS.

BUCYRUS-ERIE—GA-2 Gas-Air—1¼ high lift shovel. Single Shaft Cat. Electric Starter. Reported good operating condition. Located Eastern Pennsylvania. Box 998-SS.

TWO—BUCYRUS-ERIE—GA-3, GAS-AIR 1¼-yard shovels, Wisconsin D-2—6 cyl. 5¼"x6½" Engines. Good condition. St. Paul, Minnesota. Box 1097-SS.

BUCYRUS-ERIE 41-B — 1¼-YARD STEAM SHOVEL. Located near Boston. Very good price. Box 1096-SS.

BUCYRUS-ERIE—41-B—STEAM SHOVEL. 21' boom, 15' dipper handle, 1¼-cubic yard dipper. Now operating. Will demonstrate. Located Alabama. Box 1131-SS

If You Do Not Find What You Want Listed—Write Us

EXCAVATING engineer
South Milwaukee, Wis.

BUCYRUS-ERIE GA-3 Gas-Air 1¼-yard shovel. Electric starter. Steel cab. Single shaft Cat. Said to be in very good mechanical and operating condition. Located San Francisco. Box 1191-SS.

KOEHRING MODEL 501 1¼ yard gas shovel. Available about August 15. Located New Mexico. Box 879-SS.

LIMA MODEL 101. 1¼-yard gas shovel. Located Lampasas, Texas. Box 2027-SS.

LIMA MODEL 101. 1¼-yard gas shovel. Located New Braunfels, Texas. Box 2029-SS.

LIMA MODEL 101. 1¼-yard gas shovel. Located Catarina, Texas. Box 2028-SS.

LIMA—MODEL 101—GASOLINE SHOVEL. Located Maine. Box 1132-SS

LIMA MODEL 101. 1¼-yard gasoline shovel. 26' boom. 17' dipper handle. Waukesha Model J. K. 6½"x7" engine. Recently rebuilt. Excellent condition. Located Texas. Box 2042-SS.

LINK-BELT — MODEL K-38. Equipped with 1½-yd. Esco dipper and 50' boom dragline including bucket. Weight of machine only 82,000 lbs. Waukesha W.K. 6¾"x8" engine. Overhauled Spring 1937. Not used since. Located vicinity Spokane, Washington. Box 2015-SS.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

SMALL SHOVELS
Under 2 Yards continued

2 MARION Model 450—Steam Shovels. Good condition. Located Connecticut. Box 1154-SS

MARION TYPE 32 STEAMER. Shop No. 5676, 18-ft. boom, 15-ft. dipper handle, 1¼-cu. yd. Recently overhauled. Box 451-SS.

NORTHWEST MODEL 104, gasoline 1¼-yd. shovel and crane. Located State of Washington. Available March 1. Box 2018-SS.

OSGOOD — HEAVY DUTY — 1¼-yard Steam Shovel. Said to be in good working condition. Will sell on terms. Located Virginia. Box 1061-SS

OSGOOD. 1¼-yard gasoline shovel. 1-yard dipper also available. 4-cylinder Leroi gas engine. Only operated three months since $2,000 repairs applied. Excellent condition. Located Texas. Box 2043-SS.

1½-YARD

BUCYRUS-ERIE—42-B STEAM shovel. 1½-yard Vanderhoef quarry dipper. Very good mechanical condition. Can be demonstrated. Located Georgia. Box 1149-SS.

OSGOOD—VICTOR—GAS 1½ YD. SHOVEL & Clamshell. Shovel boom 23'. Clamshell boom 50'. Wisconsin D-4—6 cylinder 5¾"x6½" engine. Reported excellent condition. Located Minneapolis. Box 1111-SS.

1¾-YARD

BUCYRUS-ERIE 43-B late model 1¾-yd. chain crowd shovel. Electric starter. 1½ K.W. Kohler light plant. Buda-Lanova 6-cylinder 5¼"x7" Diesel engine. Located Central New York State. Excellent condition. Box 2019-SS.

5—MARION MODEL 37, 1¾ yard steam shovels, steel cab. Good working condition. Located Minnesota. Box 825-SS.

P&H MODEL 750, 1¾-yd. Diesel Shovel and 60' boom dragline with bucket. 1500 Watt Kohler light plant. Atlas Diesel 6-cyl. 7"x8½" engine. Located California. Box 2014-SS.

SMALL DRAGLINES
Under 2 Yards

⅜-YARD

BUCYRUS-ERIE 10-B GAS, 28' boom dragline and shovel. 14" treads. ⅜-yard "AU" drag bucket. Electric starter and lights. Hercules engine. 1 year old. Located Texas. Box 2026-SD.

½-YARD

MEAD-MORRISON. ½-yard dragline and shovel. Electric starter and lights. ½-yard Page drag bucket. Buda 4½"x6" gas engine. Generally fair operating condition. Located Minnesota. Box 2057-SD

¾-YARD

NORTHWEST MODEL 105 GAS—40' boom dragline and clamshell, including Page "C" drag bucket. Climax engine. Reasonably good operating condition. Located Atlanta, Ga. Box 995-SD.

OSGOOD — GASOLINE — COMBINATION dragline, clamshell and shovel equipped with electric starter. 40' dragline and clamshell boom. Shovel boom 19'6" dipper handle 14'; dipper 1 yard standard and 1½ beet loading type. Fair condition, good appearance. Located Colorado. Box 1018-SD.

OSGOOD. COMMANDER. Combination dragline, shevel and clamshell. 35' dragline and clamshell boom. ¾-yard Page drag bucket. ¾-yard Rock Type dipper. Hercules 6-cylinder 4⅛"x4½" engine. Completely rebuilt recently and new engine installed. Bucket very good. Will sell on terms. Located Texas. Box 2038-SD.

⅞-YARD

BUCYRUS-ERIE—1035—40' BOOM GASOLINE dragline and clamshell, including 1-yard dragline and clamshell buckets. 26" caterpillar treads. Recently overhauled. Located Colorado. Box 1118-SD.

1-YARD

AMERICAN. Combination 1-yard dragline and shovel. 40' dragline boom. 1-yard Omaha drag bucket. 28' shovel boom, 16' dipper handle. 1-yard dipper. Waukesha 6"x7" 95 H.P. 4-cylinder engine. Generally fair condition. Located Minneapolis. Box 2044-SD.

BUCYRUS-ERIE DA-2 DIESEL-AIR 40' BOOM dragline. No bucket. Atlas Diesel engine. Located Eastern Pennsylvania. Box 872-SD.

BUCYRUS-ERIE — D-2 — DIESEL DRAGLINE. Atlas engine. Located Texas. 40' Boom, 1¼ yd. Page Bucket. Field reconditioned. Available about September 15. Excellent mechanical and operating condition. Box 1020-SD.

MOORE—SPEED CRANE — 50' boom—1-yd. dragline and shovel. Gasoline. Located St. Paul, Minn. Box 2012-SD.

OSGOOD—1-YARD COMBINATION shovel—45' boom dragline. Le Roi 6-cyl. engine. Fair condition. Located Central Illinois. Box 1173-SD.

P & H MODEL 600, 1 YD. DRAGLINE and shovel. Dragline boom 40'. Shovel boom 19'6". Drag bucket included. Waukesha engine. Good condition. Located Central Illinois. Box 1102-SD.

1¼-YARD

BUCYRUS-ERIE E-2 dragline and shovel. 45' boom plus 10' extension. 1¼-yard Page drag bucket. 1½-yard plate dipper. Electric light plant. Atlas Diesel engine. Engine overhauled since last used. Balance of machine good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SD.

BUCYRUS-ERIE. 34-B Diesel dragline. 45' boom. Atlas engine. Good condition. Located California. Box 2022-SD.

BUCYRUS-ERIE GAS-AIR GA-2 dragline and shovel. 40' dragline boom. 24' shovel boom, 16' dipper handle. 1¼-yard dipper. Single shaft Cat. Waukesha 4-cylinder 6¼"x8" engine. Factory rebuilt 1935. Excellent condition. Located Indianapolis. Box 2041-SD.

BYERS DRAGLINE, GAS, MODEL 125, 45' boom, 1¼-yd. Omaha bucket (as good as new). Machine in A-1 operating condition. **D. M. Crawford, P.O. Box 86, Brazil, Indiana.**

LINK-BELT — MODEL K-38. Equipped with 50' boom dragline including bucket. Also 1½-yd. Esco dipper. Weight of machine only 82,000 lbs. Waukesha W.K. 6¾"x8" engine. Overhauled Spring 1937. Not used since. Located vicinity Spokane, Washington. Box 2015-SD.

P & H—MODEL 210—55' boom dragline including 1¼-yard Page bucket. Gas powered. Located South Dakota. Box 1172-SD

1¾-YARD

NORTHWEST. Type M—Gas Dragline. 40' plus 10' Extension Boom. 1¾-yard Omaha Bucket—nearly new. Recently put in good repair. Located Missouri. Box 1161-SD.

P&H MODEL 750, 1¾-yd. Diesel 60' boom dragline and shovel. With bucket. 1500 Watt Kohler light plant. Atlas Diesel 6-cyl. 7"x8½" engine. Located California. Box 2014-SD.

SMALL CLAMSHELLS AND CRANES
Under 2 Yards

⅜-YARD

BAY CITY—¾-YARD GAS CLAMSHELL. Located near Boston. Box 1084-SCC.

BUCYRUS-ERIE 10-B GAS—combination clamshell, shovel and drag shovel. 14" Cat. treads. Hercules 6-cyl. engine. Good condition. Favorable price. Located Central N. Y. State. Box 2000-SCC.

½-YARD

BUCYRUS-ERIE — TYPE A, ½-yard steam clamshell and shovel. 26' clamshell boom. Cat. mounted. Located Central Illinois. Box 2007-SCC.

BROWNING—½-YARD GASOLINE clamshell and shovel. Clamshell boom 30' plus 10' extension. Clamshell bucket included. Good condition. Located Maine. Box 1115-SCC.

BYERS-BEARCAT gasoline combination crane, skimmer scoop and back hoe. Williams Clamshell bucket included. Located Eastern Pennsylvania. Box 957-SCC.

If You Do Not Find What You Want Listed—Write Us
EXCAVATING engineer
South Milwaukee, Wis.

UNIVERSAL—THEW Model AC-35, ½-yard gasoline truck crane. 28' boom. ½-yd. Owens digging bucket. Mack truck equipped with dual hard tires rear and pneumatic tires front. Condition good. Located Central New York State. Box 1193-SCC

UNIVERSAL—24' BOOM TRUCK CRANE. Sterling truck. Excellent condition. Located Central Illinois. Box 1183-SCC.

⅝-YARD

P & H MODEL 204. 35' boom gasoline clamshell. ⅝-yard Kiesler clamshell bucket. Waukesha engine. New cab. Generally very good condition. Located Chicago. Box 2036-SCC.

¾-YARD

BUCYRUS-ERIE—TYPE B, ¾-yard, 40' boom steam clamshell and shovel. Cat. mounted. Located Buffalo, New York. Box 2005-SCC.

BUCYRUS-ERIE 1030 gasoline clamshell and shovel 35' clamshell boom and Owen "M" Model 230 clamshell bucket. 23' shovel boom. 15" dipper handle. ¾ yard dipper. Wisconsin B-3 gasoline engine. Cylinder blocks recently rebored. Machine in fair condition. Located Massachusetts. Box 982-SCC.

BUCYRUS-ERIB TYPE B STEAM combination clamshell, shovel and steam hoe. Machine completely rebuilt 1929. Good operating condition. Located near Boston. Box 517-SCC.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

BUCYRUS-ERIE—TYPE B Steam clamshell and shovel. 40' clamshell boom. 19'9" shovel boom —16' dipper handle—¾-yard dipper. Also Ford truck with 500-gallon steel water tank and pump. Reported to be in good operating condition. Located New Hampshire. Box 1164-SCC.

BUCYRUS-ERIE TYPE B, steam, ¾-yard 36' boom clamshell and shovel, including ¾-yard Williams clamshell bucket. Located Central New York. Box 1188-SCC.

NORTHWEST MODEL 105 GAS—40' boom clamshell and dragline, including Page "C" drag bucket. Climax engine. Completely reconditioned. Located Atlanta, Ga. Box 995-SCC.

NORTHWEST MODEL 105, combination clamshell and shovel. 40' clamshell boom. Type "C" Lakewood 1-yard clamshell bucket. 24' shovel boom. 17½' dipper handle. ¾-yard dipper. Twin City gasoline engine. Reasonably good condition. Located near Chicago. Box 2045-SCC.

O & S MODEL "T" ¾ yard clamshell machine. 40' boom. Good working condition. Powered with Climax 5½"x7" gasoline engine. Located near St. Louis. Good working condition. Box 651-SCC.

OSGOOD — GASOLINE — COMBINATION clamshell, dragline and shovel equipped with electric starter. 40' clamshell and dragline boom. Shovel boom 19'6"; dipper handle 14'; dipper 1 yard standard and 1½ beet loading type. Fair condition, good appearance. Located Colorado. Box 1018-SCC.

⅞-YARD

BUCYRUS-ERIE — 1035 ELECTRIC clamshell. 35' boom. ¾ yd. Haiss Coal loading bucket. General Electric motor, 40 H.P. 3 phase. 60 cycle, 220 volt induction motor. Machine in excellent condition. Located New York. Box 1101-SCC.

BUCYRUS-ERIE—1035—40' BOOM GASOLINE clamshell and dragline, including 1-yard clamshell and dragline buckets. 26" caterpillar treads. Recently overhauled. Located Colorado. Box 1118-SCC.

OSGOOD. COMMANDER. Combination clamshell, dragline and shovel. 35' clamshell and dragline boom. ¾-yard Page drag bucket. ¾-yard Rock Type dipper. Hercules 6-cylinder 4⅛"x4½" engine. Completely rebuilt recently and new engine installed. Bucket very good. Will sell on terms. Located Texas. Box 2038-SCC.

1-YARD

BUCYRUS-ERIE GA-2 COMBINATION shovel and clamshell. 24' boom, 18'4" dipper handle —1 cu. yd. cast front inserted tooth dipper. 45' boom. Complete clamshell equipment including 1 yard Williams Fav. Clamshell bucket. Air starter. Single shaft cat. Waukesha 4 cylinder 5¾"x8" gas engine. Fair operating condition. Located Eastern Pennsylvania. Box 932-SCC.

BUCYRUS-ERIE — GA-2 — GAS-AIR 45' Boom Clamshell Machine. Good Operating Condition. Located St. Paul, Minn. Box 1024-SCC.

BUCYRUS-ERIE GA-2 CRANE AND SHOVEL. 50-ft. box type crane boom. 22 ft. 6 in. shovel boom, 16-ft. dipper handle, 1 yard cast front inserted tooth dipper. Air starter. Good condition. Located Newark, N. J. Box 718-SCC.

BUCYRUS-ERIE — GA-2 GAS AIR Clamshell. 45' boom. Single Shaft Caterpillar. Waukesha 4 cylinder 6¼"x8" engine. Rebuilt since original manufacture. Good operating condition. Located New Jersey. Box 1104-SCC.

BUCYRUS-ERIE—1035—GASOLINE 40' BOOM clamshell. Machine including 1-yard Owen clamshell bucket. Single shaft caterpillar. 24" treads. Located Massachusetts. Box 1120-SCC.

MOORE—SPEED CRANE. 50' boom dragline, crane and 1-yard shovel. Gasoline. Located St. Paul, Minn. Box 2012-SCC.

P. & H. MODEL 600—40' BOOM GAS clamshell and 1-yard shovel. Waukesha JL-6"x7" Engine. Located North Carolina. Box 1095-SCC.

1¼-YARD

BUCYRUS-ERIE GA-2 Gas-Air clamshell and shovel. 45-ft. clamshell boom. 1¼-yd. shovel. Single shaft cat. Recently overhauled by owner. Located New York. Box 997-SCC.

LINK-BELT. MODEL K-2. Gas crane. 50' boom. Also 2 extra 20' inserts to make 90'. Weight 67,000 lbs. Located St. Paul, Minn. Box 2013-SCC.

NORTHWEST MODEL 104, gasoline 1¼-yard crane and shovel. Located State of Washington. Available March 1. Box 2018-SCC.

1½-YARD

BUCYRUS-ERIE. 37-B Electric 50' boom clamshell. Long cats. 24" treads. Single motor. 60 H.P. 220 volt, 3 phase, 60 cycle. Good condition. Located New York. Box 2052-SCC.

OSGOOD—VICTOR—GAS 1½ YD. clamshell & shovel. Clamshell boom 50'. Shovel boom 23'. Wisconsin D-4—6 cylinder 5¾"x6½" engine. Reported excellent condition. Located Minneapolis. Box 1111-SCC.

LARGE SHOVELS AND DRAGLINES
2 Yards and Over

BUCYRUS-MONIGHAN MODEL 3-T, 70' boom dragline including 3 and 5-yd. drag buckets. Equipped with 3-W walking device. Fairbanks-Morse Diesel 100 HP engine. Also Caterpillar engine to drive fan, water pump and compressor. Approx. weight 256,300 lbs. Located Idaho. Box 2016-LSD.

BUCYRUS-ERIE 50-B Diesel shovel and dragline. 2-yd. shovel dipper. 50' boom. Located Eastern Pennsylvania. Box 2021-LSD.

BUCYRUS-ERIE 50-B steam shovel. 30' boom 19' dipper handle. 1¾-yd. dipper. Said to be in very good condition. Located vicinity New York Box 2002-LSD.

BUCYRUS-ERIE 50-B, 2-yd. steam shovel. Good operating condition. Located Central New York State. Box 2020-LSD.

BUCYRUS-ERIE 100-C. 3-yard steam shovel. Cat. mounted. Fair condition. Located Kansas. Box 2049-LSD.

BUCYRUS-ERIE 95-C. 3-yard steam shovel. Cats. installed 1925. Fair condition. Located Kansas. Box 2050-LSD.

MARION MODEL 60. 2½-yard steam shovel on railroad trucks. Good appearance and condition. Located Kansas. Box 2051-LSD.

1½-T MONIGHAN WALKER. Diesel power. 2 yard bucket, 60-foot boom. Good condition. Reasonably priced. Located Kansas. Box 742-LSD.

CLASS 320 STEAM DRAGLINE, 144-foot boom. 3-yard bucket. Located on Illinois river. A good buy. Box 750-LSD.

CLASS 220 STEAM DRAGLINE. 175-foot steel and aluminum boom. 6-yard RED ARCH bucket. Ready to work. Located near New Roads, Louisiana. Box 751-LSD.

PRICE VERY ATTRACTIVE

BUCYRUS-ERIE 50-B STEAM combination shovel and dragline, shop number 10577. 26' boom, 17' dipper handle, 2 yd. dipper. 50' boom dragline equipment, 1⅝ yd. Page bucket. 1 KW 32 volt Moon electric light plant. 54"x9'7" standard coal burning locomotive-type boiler. Also 2 steel underframe flat cars on which machine is now loaded. New 1929. Moved only 250,000 yards of material. Excellent condition. Price very attractive. Located Kansas City, Mo. Deal direct with owner. Box 900-LSD.

2-T MONIGHAN WALKER, 3½-yard bucket. 70 foot boom. Good condition. Reasonably priced. Located Kansas. Box 743-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper and sticks. Chicago territory. Box 347-LSD.

CLASS 14 STEAM DRAGLINE, 60' boom. 2 cubic yard Page bucket. Locomotive-type boiler. Thoroughly overhauled and ready for service. Located, Iowa. Box 771-LSD.

2—BUCYRUS-ERIE 100-B steam shovels, worked only 15 months. Also, 2 Ingersoll-Rand Diesel compressors. Very low prices for immediate sale. H. W. Nelson, 1 Wall St., New York.

TWO 3-W MONIGHAN WALKERS, 3½ yards. 70- and 77-foot booms. Good condition. Reasonably priced. Located Louisiana. Box 745-LSD.

BUCYRUS 320-B STEAM STRIPPING shovel, shop number 4205, new in 1925, used less than four years. Located at Toronto, Ohio. Box 74-LSD.

2-W MONIGHAN WALKER, 2½ yard capacity 70-foot boom. Good condition. Priced reasonably. Located Louisiana. Box 744-LSD.

BUCYRUS-ERIE 50-B Steam shovel and 45-ft. boom dragline, located Montana. Attractive price. Box 845-LSD.

P&H MODEL 900, 3½ yard Diesel Shovel, 33-foot boom, 200 h.p. Fairbanks-Morse engine. Mounted on caterpillars. Box 828-LSD.

BUCYRUS-MONIGHAN 4-W Walking dragline, 80' boom 5½ yard Page bucket, 30' boom insert and 4-yard bucket. Located Tennessee. Box 844-LSD.

BUCYRUS-ERIE — 55-B — DIESEL SHOVEL. 27'6" Boom, 18' Dipper Handle, 2½ yard Dipper. Atlas Diesel Engine. New 1935. Excellent mechanical and operating condition. Located Oregon. Box 1036-LSD.

ANY FAIR OFFER ACCEPTED

Class 24 steam dragline. 100 foot boom, 5 cubic yard buckets. Skid and roller mounted. Rebuilt 1927 at a cost of $15,000. New locomotive boiler installed 1928. Will accept any fair offer. Located near Fort Worth, Texas. Box 823-LSD.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

LARGE SHOVELS AND DRAGLINES
2 Yards and Over continued

BUCYRUS-ERIE — 52-B — DIESEL 2¼ yard Shovel and Dragline. Atlas engine. Good condition. Located Eastern Pa. Box 1039-LSD.

BUCYRUS-ERIE — 100-B — STEAM SHOVEL. 3 yard Dipper. Revolving machinery, very good condition. Located Montreal, Canada. Box 1041-LSD.

BUCYRUS-MONIGHAN—MODEL 4-T — 4-yard Diesel Dragline. 110' Boom. Good Condition. Located Nebraska. Box 1047-LSD.

MARION—MODEL 350—8 yard Electric Shovel. Power equipment, 3 Phase, 60 cycle, 2300 volt—Ward-Leonard Control. Mounted on railway trucks. Good condition. Located Minnesota. Box 1049-LSD.

MARION—MODEL 70—3½ yard Electric Shovel. Railway truck mounted. Power Equipment, 3 Phase, 60 cycle, 2300 volt. Good condition. Located Ohio. Box 1050-LSD.

PAGE—MODEL 220—2½ yard Diesel Dragline. 85' Boom. Good operating condition. Located Iowa. Box 1052-LSD.

BUCYRUS-MONIGHAN 3-T DIESEL dragline. 80-ft. steel boom, 3 cu. yd. drag bucket. 120 h.p. Fairbanks-Morse type "YVA" engine. 1500 watt Kohler light Plant. Just completed job on Illinois River. Box 1056-LSD.

BUCYRUS-ERIE — 75-B Electric Combination Shovel and Dragline. 29-ft. shovel boom, 20-ft. dipper handle, 2½-yard dipper, 85-ft. dragline boom with mast suspension. Suitable for power supply, 3 phase, 60 cycle, 2300 volt. Induction motors. Said to be in excellent working condition. Located Eastern Pennsylvania. Box 1058-LSD.

BUCYRUS-ERIE 50-B — 2-yard Steam Shovel. Located Texas. Low Price. Box 1059-LSD

BUCYRUS-ERIE 55-B—Extra High Lift Diesel Shovel. 35-ft. boom. 22-ft. dipper handle, 2 cu. yd. Bowl Door dipper. Caterpillar mounted. Kohler light plant. Atlas Diesel engine. Used about three months. Just like new. Located Eastern Pennsylvania. Box 1069-LSD.

PAGE—MODEL 220 — Electric dragline. 90' boom, 3½-yard Page R.C. drag bucket. Box 1124-LSD

BUCYRUS-ERIE—CLASS 24 DIESEL dragline. 130-ft. boom, 4 cu. yd. bucket. Truck mounted. 165 h.p. Anderson Diesel engine. Friction drive. Said to be in good operating condition. Located on Mississippi River near New Orleans convenient for loading on barge. Box 1074-LSD.

BUCYRUS-ERIE—175-B TRACK MOUNTED steam shovel. 85' boom, 53' dipper handle, 3½-yard dipper. Good condition except dipper handle and boiler. Bargain. Located near Pittsburg, Kansas. Box 1134-LSD.

BUCYRUS-ERIE—175-B TRACK MOUNTED steam shovel. 75' boom, 48' dipper handle, 3½-yard dipper. Located North Dakota. Box 1137-LSD

LOCOMOTIVES

LOCOMOTIVES

1 Baldwin Locomotive, 17x24, standard gauge, 45-ton, shop No. 33262.
2 Baldwin Locomotives, 19x26, standard gauge, 6-wheel, shop Nos. 39534 and 39536.
4 American Locomotives, 20x26, 60-ton, shop Nos. 5945, 5949, 42354 and 45323.
All of the above have passed State Boiler Inspection yearly; will stand 240 lb. cold water tests. At present are in actual service in Minnesota Mines. Box 1194-ME.

MISCELLANEOUS EQUIPMENT

BABY MACK—DUMP TRUCK. 4-yard Heil Dump body and 3-ton wood coal body. Hi-Lift Heil Hoist. Pneumatic tires all around. Good condition. Located New York. Box 2048-ME.

TRACTOR DUMP WAGONS, Automatic, McCormick-Deering powered. 5-yard capacity. Either track mounted, pneumatics or steel wheels. Several new and used available at bargain prices. Box 1174-ME

FRUEHOFF SEMI-TRAILER with 8' by 26' Deck. (Can be shortened). Excellent solid rubber tires. Air Brakes. 20 ton capacity. Located New York. Box 1160-ME

DRAG BUCKET

BUCYRUS-ERIE 1½-YARD Type "Y" Drag Bucket. Good condition. Located Kansas. Box 1166-ME

DRAGLINE EQUIPMENT

72-ft. Dragline Boom and Fairlead—Hydraulic Equipment—1 Hoist Drum—1 Drag Drum—1 Boom Suspension, Sway Brace and Suspension Cables. All suitable for application to Bucyrus-Erie Model 75-B Machine. Located Eastern Pennsylvania. Box 1060-ME.

BARGAIN—NEW DIESEL COMPRESSOR ATLAS DIESEL POWERED portable air compressor, 4 cylinder, 60 H.P. engine of dustproof type, skid mounted, self contained, complete with radiator cooling system. Direct connected to a 320 cubic feet Worthington Feather Valve Compressor. Brand new and a bargain to the first comer. Atlas Imperial Diesel Engine Company, Oakland, Calif.

HAISS EXCAVATOR — C7097, June 1930. Weight 11 tons. Needs new teeth. 33" per minute crowding. Price $1800. Box 990-ME.

CAR TRANSPORTER

CAR-TRANSPORTER or stacker with reach of 135' and dumping height of 75'. Equipped with 4-yard aluminum car. Caterpillar-mounted and suitable for use with shovel having per hour output of 250 yards. Electric drive, 3-phase, 60-cycle, 4000-volt current. This car transporter is in excellent condition and priced to sell. Located near Kansas City, Missouri. Box 2010-ME.

SHOVEL EQUIPMENT—Late design—suitable for Bucyrus-Erie 52-B Diesel. Only handled about 4,000 yards material. Equipment located Alabama. Box 1113-ME

FRONT FOR 32 MARION

1½ CU. YD. shovel front end—new dipper—for Marion 32 steamer. Priced right. Located near Chicago. Box 857-ME.

THREE-QUARTER YARD CLASS "C" Page dragline bucket, 45' boom with gantry and tagline weight, swing type fairlead. Adaptable to Northwest 104-105. Located Crystal Falls, Michigan. Box 1170-ME

INDUSTRIAL STEAM WRECKING DERRICK. Non-propel. Rating 50 tons at 20' with outriggers. Located Nebraska. Box 1171-ME

BUCYRUS-ERIE—4½-YD. 4-wheel scraper. Practically new. Located Central Illinois. Box 1177-ME

BARBER-GREENE—MODEL B-44 ditcher. Located North Carolina. Box 1180-ME

KOEHRING DRAG SHOVEL equipment for Model 301 machine. Used very little. Low price. Located Eastern New York State. Box 1181-ME

USED CONTRACTORS EQUIPMENT

1—Model 100 Lincoln Revolver with 100' boom and 12' Gantry.
2—275 Koehring Mixers with Electric motors.
1—200-ton Blaw-Knox Bin with weighing batchers, cement scale and push button control.
1—Robinson Pneumatic cement unloader with silo.
1—20-ton Whitcomb Gasoline Dinkey, overhauled.
4—18-ton Steam Dinkeys, overhauled.
12—30-yd. Western Lift Door Air Dump cars.
12—30-yd. Koppel Drop Door Air Dump cars.
26—16-yd. K. & J. Lift Door Air Dump cars.
6—20-yd. K. & J. Lift Door Air Dump cars.
6—2-cu. yd. Blaw-Knox Roller gate Concrete Buckets.
7—70-ton 20x36 Baldwin Switchers.
1500 tons used steel sheet piling—Sections M-111, M-112 and M-115 35 to 50' lengths.
3—Jordan spreaders excellent condition.
Located Mississippi valley. Box 2011-ME.

DRAG SHOVEL EQUIPMENT—consisting of 18' boom, 7'6" dipper handle and ½-yd. front-opening dipper suitable for application to Bucyrus-Erie 1020 shovel. Located Rhode Island. Box 2003-ME.

EUCLID-TUWAY 11-CU. YD. dump wagon. Hydraulic hoist. Worked only 320 hours. Located Central New York State. Box 1189-ME.

ERIE AGGREMETER BIN—80-ton capacity with 3 compartments, including weighing scales. Only handled 10,000 tons. Located Central New York State. Box 1190-ME.

If You Do Not Find What You Want Listed—Write Us

EXCAVATING engineer
South Milwaukee, Wisconsin

MINING AND QUARRY EQUIPMENT

The following equipment is located in Minnesota. Full details on request.

3—Boilers.
12—36" gauge Koppel double truck flat cars.
6—36" gauge Peteler 4-yard two way dump cars.
4—Swing & Boom engines for Marion 31 & 36 shovels.
1—Austin-Western grader, 8' blade and scarifier.
4—Hoists—Single and double drum.
2—Milwaukee gasoline locomotives, 7-ton 24" gauge.
3—Electric motors, 100 to 150 h.p.
8—Pumps—Steam and gasoline.
1—Special Twin City Tractor.
1—Complete Ainley Placer gold machine.

Box 833-ME.

CONCRETE VIBRATOR
with grinding attachment.

MASTER VIBRATOR, powered with a 3 h.p. Wisconsin engine and equipped with 20' of hose and grinding attachment. Practically new, used on less than 200 cubic yards of concrete. Will take $450 for entire outfit, f.o.b. Mobile, Ala. Here is a pick-up for someone at this price. Box 1125-ME

WANTED

WANTED: Bucyrus-Erie Diesel shovels, Models 34-B, 43-B, 19-B. State cash prices and full particulars to, B. Caten, Box 54, Postal Station D, Toronto, Canada.